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**US Army Corps
of Engineers**

New Orleans District

**CULTURAL RESOURCES INVESTIGATIONS OF THE
EAST AND WEST BAYOU SALE TIE-IN LEVEE,
ST. MARY PARISH, LOUISIANA**

Final Report

October 1998

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REPLY TO
ATTENTION OF:

September 23, 1998

Planning, Programs
& Project Management Division
Environmental Planning
& Compliance Branch

To the Reader:

This cultural resources effort was designed, funded, and guided by this office, as part of our cultural resources management program. Documented in this report are cultural resources investigations of archeological site 16SMY66, a portion of the Stokely Vinson/North Bend Plantation in St. Mary Parish, Louisiana.

This office and the Louisiana State Historic Preservation Officer concur with the contractor's conclusion that site 16SMY66 meets the criteria for inclusion in the National Register of Historic Places. Both offices also concur in the research design for archeological data recovery contained in Chapter 9 of the report. The archeological data recovery program will be accomplished prior to project construction.

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14. ABSTRACT This report presents the results of cultural resources investigations by Earth Search, Inc. (ESI), for the East and West Bayou Sale Tie-in Levee, St. Mary Parish, Louisiana. The Tie-in Levee consists of new levee construction between the two existing levees which flank Bayou Sale, and foreshore protection along the south bank of the Gulf Intracoastal Waterway (GIWW) where it crosses the bayou. The project right-of-way has an average width of 200 ft (60.96 m) and contains approximately 20.43 ac (8.27 ha). ESI conducted Phase I intensive pedestrian survey of the proposed construction right-of-way and did not locate any previously unknown cultural resources. However, Phase II National Register test excavations were conducted at the previously-recorded North Bend Bridge site (16SMY66), which is located within the Area of Potential Effect (APE). Excavations included three backhoe trenches and four 1 x 1 m hand units. These excavations revealed the presence of intact domestic midden at the site, demonstrating that the site possesses the quality of integrity necessary for nomination to the NRHP. Cultural deposits are associated with the post-1905 occupation of the area by quarters cabins of the consolidated Stokley/Vinson North Bend Plantation site (16SMY132) located across the GIWW and north of 16SMY66. It is recommended that if these sites can not be avoided during construction, that archeological data recovery be undertaken simultaneously at 16SMY66 and 16SMY132. A research design for data recovery at these two sites is presented.			
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CHAPTER 1 INTRODUCTION

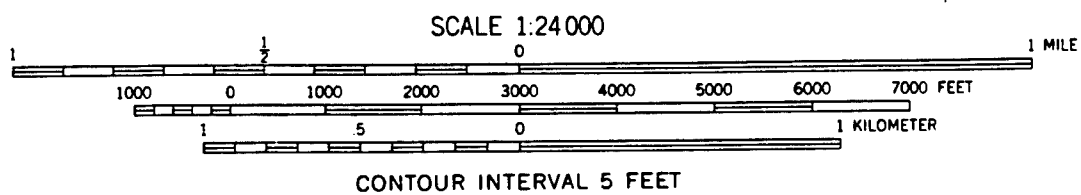
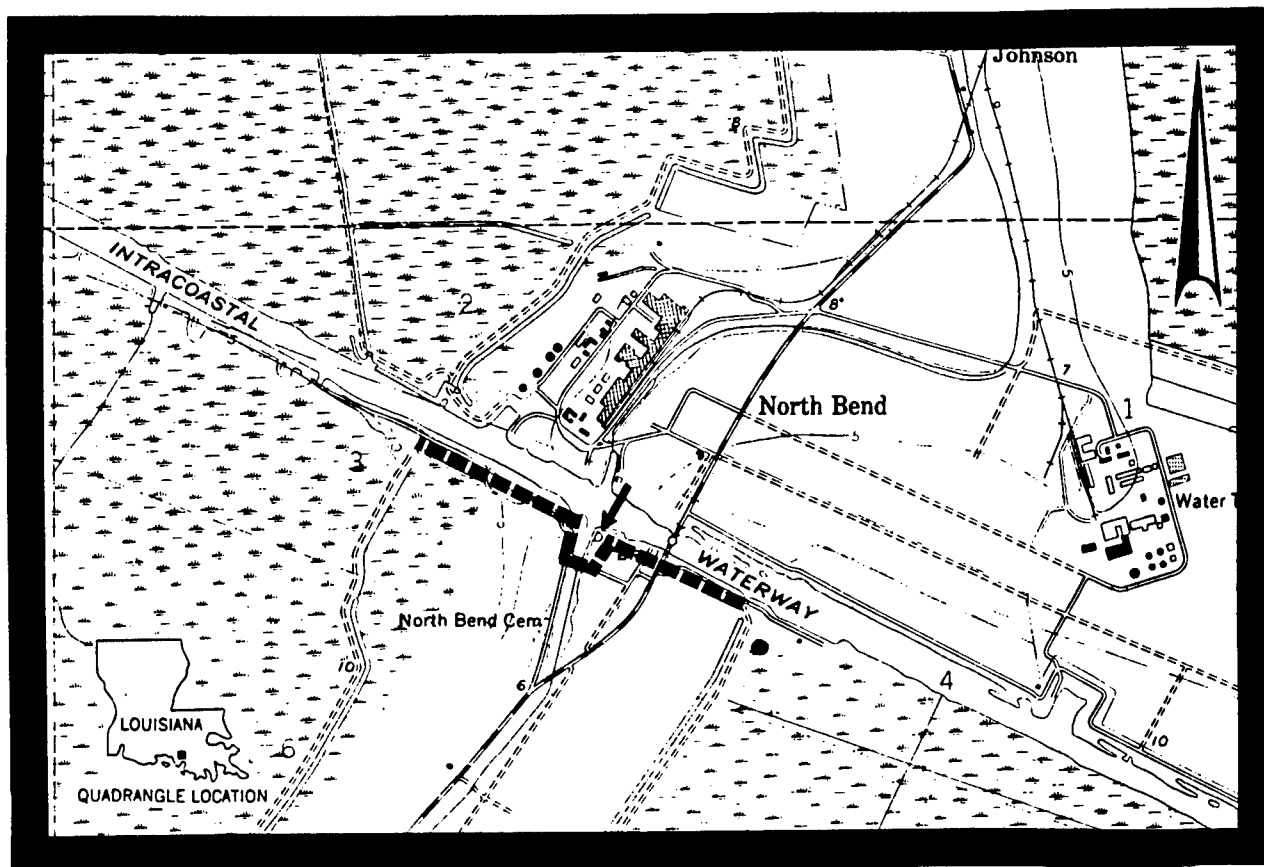
This report details the results of cultural resources investigations by Earth Search, Inc. (ESI), for the East and West Bayou Sale Tie-in Levee, St. Mary Parish, Louisiana (Figure 1). In support of proposed improvements to the Atchafalaya Basin, Levees West of Berwick project, ESI was contracted by the New Orleans District, U.S. Army Corps of Engineers (NODCOE), to perform historical research, a pedestrian survey of the levee right-of-way and National Register of Historic Places (NRHP) testing at the North Bend Bridge site (16SMY66). The survey and site testing was conducted within the limits of levee work from Sta. 0+00 (on western end) to Sta. 36+43.8 (on eastern end), from the water's edge of the (GIWW) to the outside right-of-way line. This proposed project will consist of new levee construction between the two existing levees which flank Bayou Sale and foreshore protection along the south bank of the Gulf Intracoastal Waterway (GIWW) where it crosses the bayou. The project right-of-way has an average width of 200 ft (60.96 m) and contains approximately 20.43 ac (8.27 ha). Phase I archeological investigations were conducted in the proposed construction easement. No previously unknown cultural resources were discovered during survey. In addition, Phase II investigations were conducted at the North Bend Bridge site (16SMY66), which is located within the Area of Potential Effect (APE). Archeological excavations clearly demonstrated that intact deposits exist at 16SMY66 and are associated with the workers quarters of the early-twentieth century Stokely Vinson/North Bend Plantation.

Description of Project Action

The proposed action includes the project right-of-way for the East and West Bayou Sale Tie-in Levee. The right-of-way begins at Sta. 0+00 at the west end of the project area and proceeds east to the west bank of Bayou Sale before turning south at Sta. 18+02.53. From this southern turn, the right-of-way crosses part of a sugarcane field before turning east and crossing Bayou Sale. Turning north from Sta. 6+36.97 Spur, the right-of-way parallels the east bankline of Bayou Sale and crosses the western part of 16SMY66 to rejoin the south bankline of the GIWW at Sta. 20+78.53. Progressing east from the junction, the right-of-way parallels the GIWW until it connects to an existing levee at Sta. 36+43.0 (Figure 2).

The baseline of the construction right-of-way roughly parallels the access roads which follow the GIWW bankline. Impacts from construction may occur from the bankline to 50 ft (15.23 m) south of the construction baseline. Foreshore protection will involve bankline grading and the placement of shell and rock on the bankline of the GIWW. Additionally, impacts south of the GIWW bankline would most probably occur and be most destructive in the trench (muck trench) excavated down the right-of-way baseline to facilitate levee construction (Figure 3).

ESI conducted pedestrian survey of the proposed construction right-of-way and test excavations at 16SMY66. While the survey of the levee right-of-way failed to located any intact cultural resources, the test excavations at 16SMY66 discovered clear evidence of intact historic deposits dating to the early-twentieth century. Based on data gathered, the North Bend Bridge site is eligible for nomination to the NRHP. Furthermore, ESI recommends that either the construction design and placement of the levee be modified to avoid 16SMY66 or that data recovery be undertaken to mitigate the impacts of the proposed construction to the site.



- East and West Bayou Sale Tie-in Levee Survey Area
- ← Location of 16SMY66

Figure 1. Excerpt from 1966 *North Bend, Louisiana*, quad showing the study area and the location of 16SMY66.

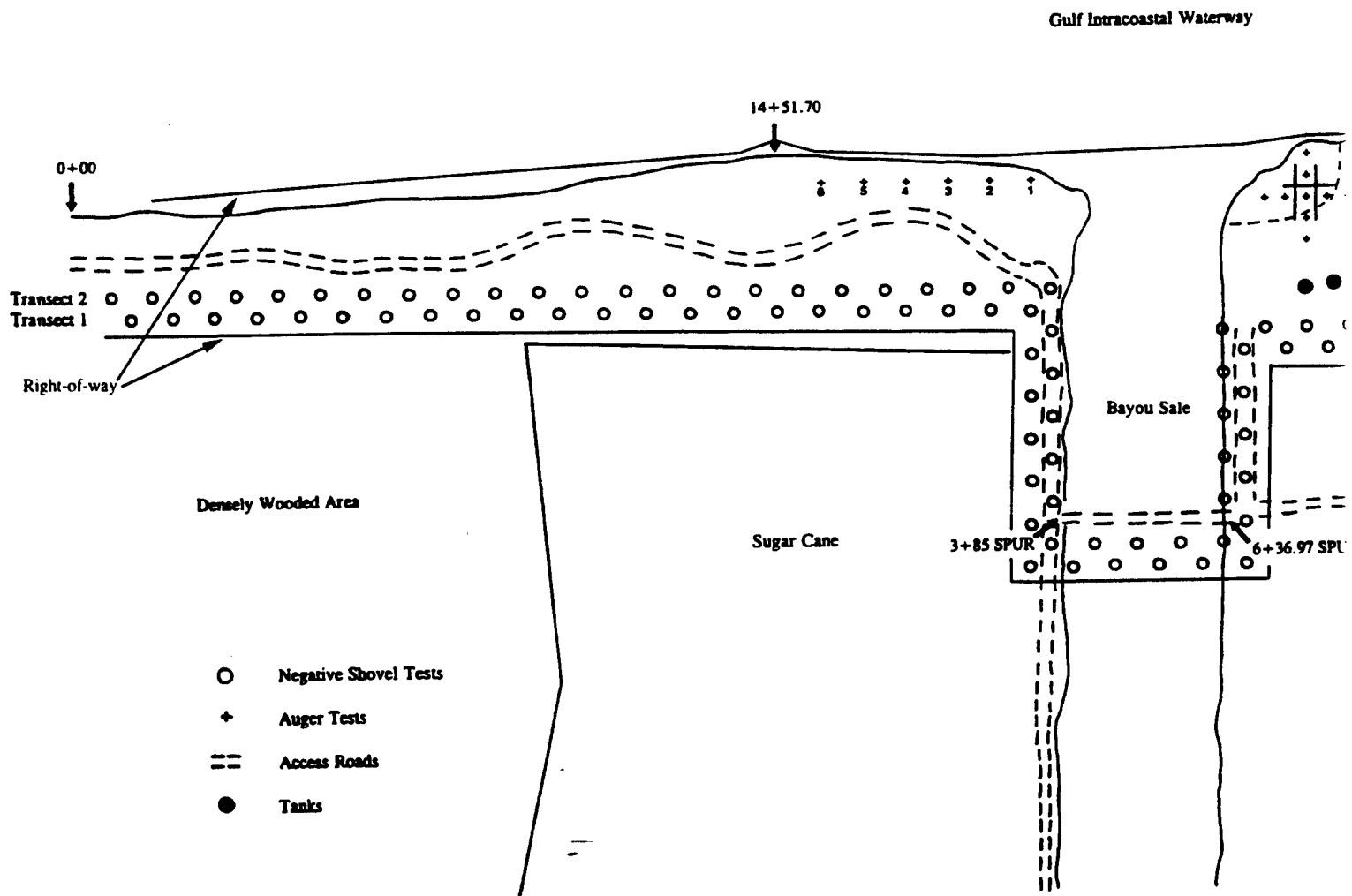
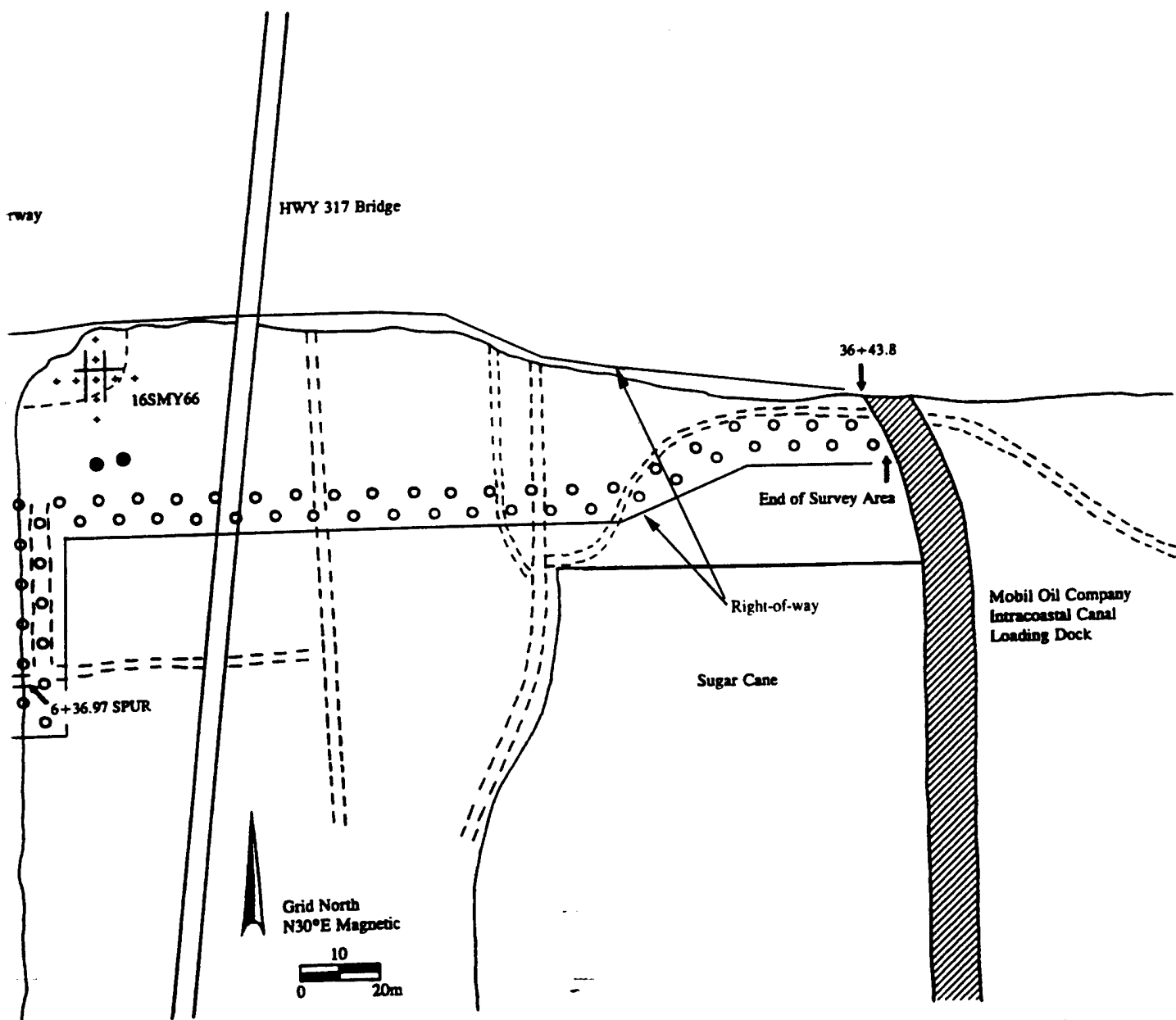


Figure 2. Map of project r



o of project right-of-way.

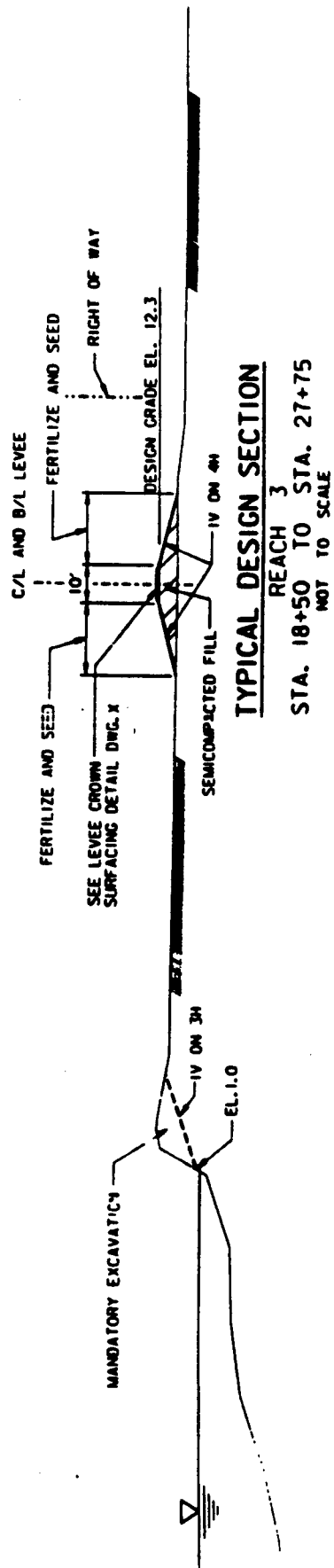


Figure 3. Typical design section for new levee construction and bankline stabilization depicting potential impacts to cultural resources.

Report Organization

Chapter 2 provides an environmental overview of the region. Chapters 3 and 4 present discussions of the prehistory and history of St. Mary Parish, respectively. Chapter 5 summarizes the previous archeological investigations in the vicinity of the project area. Chapter 6 provides a discussion of field methodology and the results of the field investigations. Chapter 7 provides a discussion of laboratory methodology and the results of artifact analysis. Recommendations are presented in Chapter 8, and Chapter 9 presents a research design for data recovery at 16SMY66 and 16SMY132.

CHAPTER 2

ENVIRONMENTAL SETTING

Physiography

The study area is located in the Atchafalaya Basin in the central portion of the Mississippi Delta Plain, situated between the Teche Ridge on the north, the Lower Atchafalaya River on the east, and Bayou Cypremort on the west. Over the past 9,000 years, the periodic progradation of delta complexes associated with the Mississippi and Red Rivers has formed the contemporary, compound geomorphic surface found in the project area (Autin et al. 1991, Kuttruff et al. 1993). The geomorphic surface is comprised of numerous coalesced or partially buried deltaic plains, representing the surfaces of individual delta complexes (Kuttruff et al. 1993).

Geological History

Deltaic growth is the dominate process shaping the geological history of the East and West Bayou Sale Tie-in Levee regional setting. Several active and inactive deltaic complexes have been identified in the Mississippi River deltaic plain. Seven deltaic complexes, corresponding to changes in the course of the Mississippi River, have been delineated and include, from oldest to youngest, the Outer Shoal, Maringouin, Teche, St. Bernard, Lafourche, Plaquemine, and the Atchafalaya (Saucier 1994:276-286). Two of these complexes, Maringouin and Teche, are located in the project area. The remaining delta plains of the Mississippi developed east of the study area approximately 4800 years B.P. (Kuttruff et al. 1993).

The Mississippi River created the Maringouin Delta Complex during a temporary stasis of sea level fluctuation between approximately 8,000 and 6,000 B.P. (Frazier, 1967; Smith et al. 1986; Kuttruff et al. 1993). After its initial creation, most of the surface of the Maringouin delta complex was deeply eroded and later submerged due to the continued rise in sea level. The maximum extent of the Maringouin delta reached a point approximately 75 to 80 km (46.6 to 49.7 mi) south of Point Chevreuil along the coast of St. Mary Parish (Penland 1990, Kuttruff et al. 1993). Most research agrees that four distinct stream courses are discernible in this deltaic complex, which include the Sale course 3, the Sale course 4, North Bend, and Clausen-Possum Point (Van Lopik, 1955; Kearns, 1985; Smith et al. 1986; Kuttruff et al. 1993). The presently buried natural levee surfaces of these Maringouin distributaries were once stable and exposed for hundreds of years. Thus, these landforms could have been utilized by humans as early as the Archaic period.

The subsequent Teche Delta Complex formed between 5800 and 3900 years B.P., after sea level had stabilized. Within the study area, the Teche complex has buried the intact surface of the Maringouin complex. The major distributaries identified in the Teche system are Bayou Sale and Bayou Cypremort (Smith et al. 1986). Based on recent geomorphic reconstructions, the Teche system distributaries would have been available for use during the Tchefuncte and Marksville Periods (Smith et al. 1986; Saucier 1994).

Atchafalaya Basin

The Atchafalaya Basin is a backswamp of extraordinary size that lies within the lower Mississippi Alluvial Valley. This backswamp lies within a large, roughly lens-shaped, shallow depression that is about 175 km (107 miles) long along a north-northwest to southeast trend and 55 km (34 miles) wide at the latitude of Baton Rouge. This depression consists of a basin bounded by the natural levees of active and relict Mississippi River meander belts. The modern Mississippi River meander belt, Meander Belt No. 1 of Autin et al. (1991), forms the

northeastern and eastern boundaries of this basin. The natural levees of Meander Belt No. 1 rise as much as 10 m (33 ft) above the backswamps of the Atchafalaya Basin. Major distributary channels, such as Bayou Latenache, Bayou Fordoche, Bayous Grosse Tete and Blue, and others, extend from abandoned channels or the active Mississippi River channel within Meander Belt No. 1 into the Atchafalaya Basin. To the south, the main channel of the Lafourche Delta Complex, Bayou Lafourche, and its distributaries comprise the southeastern boundary of this basin. The western and southern boundaries of the Atchafalaya Basin are defined by an abandoned meander belt of the Mississippi River now occupied by Bayou Teche and designated "Meander Belt No. 3" by Autin et al. (1991). The natural levees of Meander Belt No. 3 are generally 5 to 6 m (16 to 20 ft) higher than the adjacent backswamps of the Atchafalaya Basin as far south as Centerville, Louisiana. A relict Red River meander belt bridges the 25 km (15 mile) space between Meander Belt No. 1 and Meander Belt No. 3 to form the northern boundary of the Atchafalaya Basin (Lenzer 1981; Saucier and Snead 1989; Smith et al. 1986).

By definition, the Atchafalaya Basin, except for the Atchafalaya River and its channel margins, is a large flood basin. A flood basin is a broad depression of low relief that lies between alluvial ridges of meander belts or a meander belt and a valley wall. A large flood basin, such as the Atchafalaya Basin, consists of both permanently to semi-permanently flooded swamps, called "backswamps," and open expanses of water in the form of fresh-water lakes. Both the backswamps and lakes receive large quantities of fine-grained, usually clayey, suspended sediments during floods. Otherwise, because of the high plant productivity of this flood basin and its shallow water table, large amounts of plant debris accumulate as a part of its clayey backswamp and lacustrine sediments.

Bayou Sale Distributary

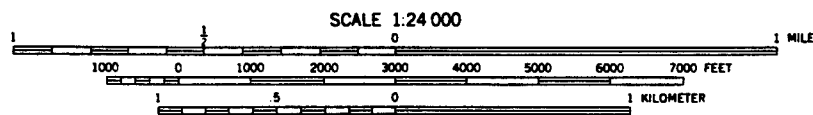
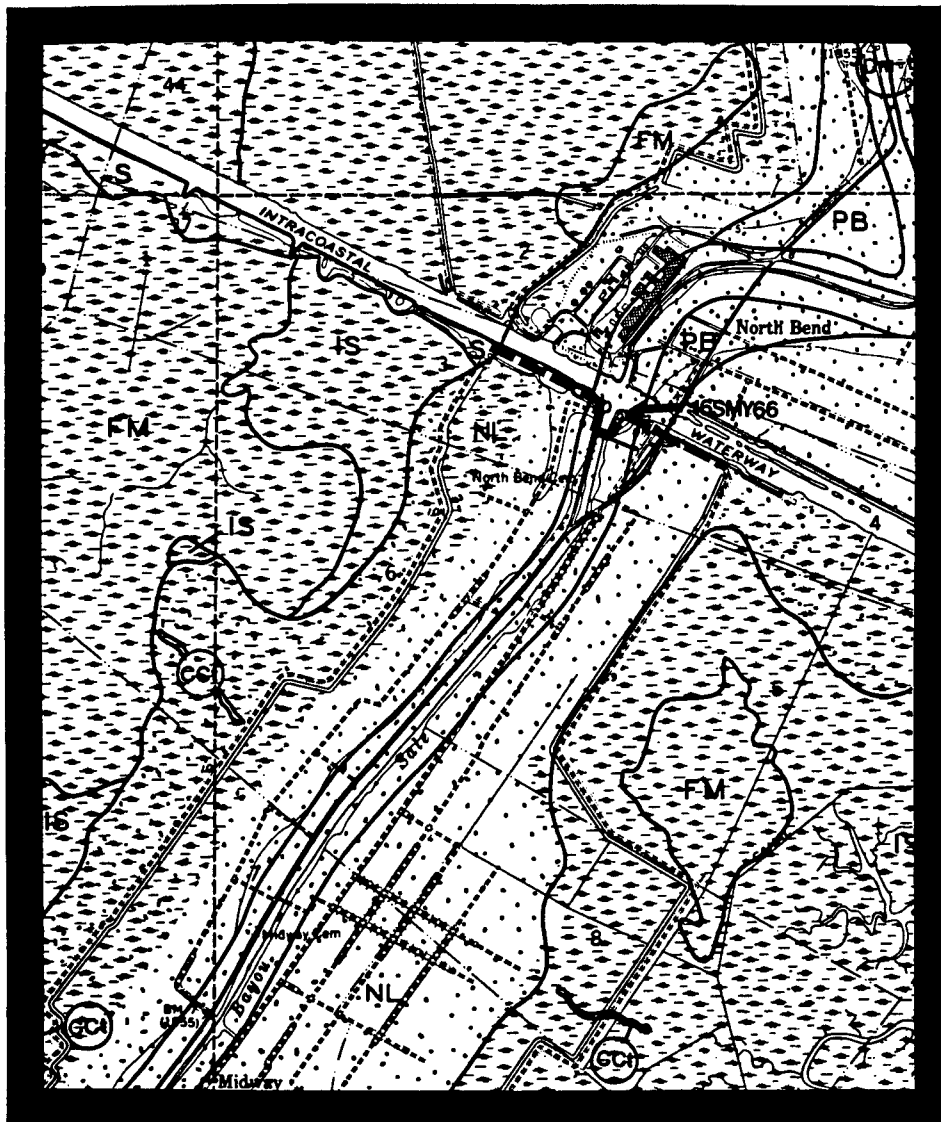
The project area lies within a segment of the Bayou Sale distributary near North Bend, Louisiana. Four terranes within this portion of Bayou Sale have been mapped and include the abandoned channel of Bayou Sale, the natural levees associated with Bayou Sale, the bordering inland swamp, and fresh marsh (Smith et al. 1986; Kuttruff et al. 1993). A terrane, by definition, consists of a mappable portion of the land's surface exhibiting a distinctive assemblage of landforms underlain by a specific sedimentary facies (Kuttruff et al. 1993:9).

Natural Levee Terrane

The survey area is situated on the natural levees of the abandoned Bayou Sale distributary (Figure 4). The natural levees extend 0.5 to 0.7 km (0.31 to 0.43 mi) from either side of Bayou Sale and beneath the adjacent swamp. Crest elevations range between 2 to 2.5 m (6.6 to 8 ft) above mean sea level (U.S. Geological Survey 1980).

Sediments found in Bayou Sale natural levees include Baldwin and Cypremort soils of well-consolidated silty clays containing thin beds of silt and clay. These upper sediments are highly oxidized, massive, and intensively burrowed. The lower sediments contain numerous thin, parallel and undulating layers disturbed by bioturbation (Kuttruff et al. 1993). Some research suggests that the Maringouin delta complex lies directly beneath the Teche Delta Complex (Van Lopik, 1955; Smith et al. 1986; Kuttruff et al. 1993). Foundation borings for the North Bend Intracoastal Canal Bridge, Structure No. 02430200001 indicates a combined thickness of 24 m (79 ft) for both the Maringouin and Teche delta complexes (Kuttruff et al. 1993:14).

Baldwin and Cypremort soils have developed within the frontslopes and crests of the natural levees. Backslopes within the natural levees consist of Baldwin soils, and the relict crevasse splays and lower backslopes of the natural levees consist of Iberia and Jeanerette soils. Cypremort silt loam and very fine sandy loam, Baldwin silt loam, Alligator clay, and



GEOMORPHIC LEGEND	
MAP SYMBOL	ENVIRONMENT
AC	ABANDONED COURSE
DC	DISTRIBUTARY CHANNEL TECHE
DCM	DISTRIBUTARY CHANNEL MARINGOIN-TECHE
CC	CREVASSE CHANNEL TECHE
BS	BACKSWAMP
IS	ISLAND SWAMP
PS	POINT BAR
LD	LACUSTRINE DELTA
FM	FRESH MARSH
S	SPOIL
	NATURAL LEVES MAPPED AS OVERLYING OTHER ENVIRONMENTS NORTH OF TECHE RIDGE
	NATURAL LEVES MAPPED AS PRIMARY ENVIRONMENT SOUTH OF TECHE RIDGE

Figure 4. Terranes of Bayou Sale within the survey area (after Smith et al. 1986: Plate 33).

local alluvium indicate that the current project area lies within the front slopes and crests of the Bayou Sale natural levees.

Abandoned Distributary Channel Terrane

Site 16SMY66 is situated upon the natural levees which were deposited over the filled abandoned channel of Bayou Sale. Smith et al. (1986) postulate that, when fully active, the abandoned channel of Bayou Sale was approximately 200 to 250 m (656 to 820 ft) wide. The fill of the original channel contains up to 12 m (39.4 ft) of varying thin to thick beds of well-sorted sand, interbedded with thin beds of silty clay which is overlain by less than 1.5 m (5 ft) of black, organically rich clay (Coleman 1966; Kuttruff et al. 1993). Cypremort soils form the edges of the abandoned channel and are located within natural levee deposits which accumulated during the abandonment of the distributary.

Inland Swamp and Fresh Marsh Terrane

The Teche Delta Plain, formed by inland swamp, is located adjacent to the natural levees of Bayou Sale as well as the current survey area and 16SMY66. This area is a delta plain which receives annual fresh water as a result of overflow during seasonal flooding. Salt water intrusion is rare due to the inland location of the swamp (Smith et al. 1986; Kuttruff et al. 1993).

The "swamp, clays, and swampy clays" of the inland swamp consist of organically rich mud or peat which covers well-consolidated, oxidized natural levee deposits (Lytle et al. 1959; Kuttruff et al. 1993). Small patches of fresh water marsh consisting of perennially water-covered delta plain covered by floating marsh also occur within the Teche delta plain. A vegetative mat approximately 10 to 35 cm (3.9 to 13.7 in) thick overlays a 1 to 4.5 m (3.28 to 14.7 ft) lens of finely divided muck which grades into clay (Smith et al. 1986; Kuttruff et al. 1993).

Soils

Two primary soil associations, Baldwin and Cypremort, comprise the vast majority of soils in and adjacent to the project area (Loftin and Agnew 1969:Sheets 31 and 32). Both associations are located upon and form within natural levee deposits flanking major stream courses. Man made soils are found paralleling both banks of the GIWW and represent spoil from dredging activities. Local alluvium is a very minor soil component in the project area. The origin of this soil type is unknown, and no subsurface profile has been recorded (Loftin and Agnew 1969:Table 11).

The Cypremort association is located along the front slope and crest of the natural levees of Bayou Sale, while the Baldwin association is found on the crest and backslope. Cypremort very fine sandy loam would usually be encountered along the surface except when erosion has occurred. In these circumstances, Cypremort silty clay loam would be encountered just below ground surface. Similarly, Baldwin very fine sandy loam would be the surface expression of the association and would be found adjacent to the Cypremort very fine sandy loam. The very fine sandy loam facies of the Baldwin association would grade into the Baldwin silt loam facies along the backslope of the natural levee. Further away from the natural levee, near either the inland swamp or fresh water marsh, Baldwin silt loam will grade into the Baldwin silty clay loam facies (Loftin and Agnew 1969:Sheets 31 and 32).

Both the Baldwin and Cypremort very fine sandy loam units have little or no flood hazard potential, making them extremely suitable for habitation and agriculture. Their moderate to moderately rapid permeability rate allows rain and flood waters to drain away and not

pool for extended lengths of time (Loftin and Agnew 1969:4). These soils provide excellent bases for structures, even those with fairly low foundations. The flood hazard potential rises for the silt loam and silty clay loam facies of both associations. Their permeability rates are also slower and cause these soil units to be inundated for brief periods of time. The potential for flooding and slower permeability rates make these soils less suitable for habitation, but does not seriously effect their potential for growing crops (Loftin and Agnew 1969:Tables 11 and 12).

Climate

The climate in St. Mary Parish is like that of the rest of coastal Louisiana. This is a subtropical region characterized by long, hot, humid summers; and short, mild, humid winters (Lytle et al. 1956; Murphy et al. 1977). Rainfall is frequent throughout the year, with slightly less precipitation in the fall. October is in general the driest month. Temperatures range from 40°-60°F in the winter to 80°-90°F in the summer (Lytle et al. 1956; Murphy et al. 1977). Hurricanes and storm surges occur intermittently, and these have profound effects on floral, faunal, and human communities within the parish and the larger Atchafalaya Basin.

Plant Communities

Prior to European occupation of the Bayou Sale area, little is known of the natural levee vegetation community. Comparisons with present-day plant communities indicate these natural levees are covered by an oak forest floral assemblage. The dominating flora of the natural levees would have been live oak (*Quercus virginiana*), Nuttall oak (*Quercus nuttalli*), water oak (*Quercus nigra*), hackberry (*Celtis laevigata*), cottonwood (*Populus deltoides*), and sweetgum (*Liquidambar styraciflua*). The understory elements would have included wax myrtle (*Myrica cerifera*), elderberry (*Sambucus canadensis*), and hawthorn (*Crataegus* sp.).

Animal Communities

A variety of mammals, birds, and reptiles were undoubtedly supported by the different ecological niches found in the Mississippi River Deltaic Plain. Mammals such as opossum (*Didelphis virginiana*), bobcat (*Lynx rufus*), squirrels (*Scirus* spp.), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*) occur in the area. Birds are also abundant including marsh hawk (*Cirus cyaneus*), woodcock (*Philohela minor*), and wild turkey (*Meleagris gallopavo*) to name a few. A variety of species of reptiles and amphibians also thrive in the area. The abundant waters and the lesser backswamp contain the most common fishes including bowfin (*Amia calva*), buffalo (*Ectiobus* spp.), garfish (*Lepisosteus* spp.), sunfish (*Lepomis* spp.), catfish (*Ictalurus* spp.), and drum (*Aplodinotus grunniens*).

Geoarcheology

The majority of archeological deposits are located upon the natural levees of major bayous and rivers within the Mississippi River Deltaic Plain. Apparently, prehistoric people extensively utilized the natural levees for habitation due to a lack of alternative landforms within the deltaic system. Also, the natural levees would provide a stable "platform" to exploit the rich deltaic ecosystem surrounding the natural levees (Kuttruff et al. 1993). Other advantages of natural levees may have been:

- (1) natural levees provided habitat for terrestrial game which was exploited as a food source;
- (2) they provided a source of raw materials;
- (3) their proximity to open water provided both subsistence and transportation; and
- (4) they provided a location safe from natural hazards such as flooding and hurricane storm surge (Kuttruff et al. 1993:20).

Along the natural levee, specific locations such as the confluence of distributary channels with the trunk/main channel, appear to be occupied by major sites. Smaller sites would have been located on natural levees between the major confluences. Varying factors such as transportation, comfort, and subsistence may have determined these locations (Kuttruff et al. 1993:20).

Kuttruff et al. (1993) describe the specific distribution and types of sites found along the entire Bayou Sale distributary channel. This survey of sites clearly indicates the utilization of the natural levee terrane of Bayou Sale for habitation.

A total of 12 sites were recorded within the Bayou Sale area. Ten of these sites were recorded as prehistoric sites, and two were historic sites. Seven of the ten prehistoric sites, including 16SMY159, 16SMY157, 16SMY158, 16SMY08, 16SMY17, 16SMY155, and 16SMY118, occur within the natural levee terrane of Bayou Sale. Of the sites located within the natural levee, four were represented as surface scatters, while the remaining three were buried deposits exposed by dredging and erosion. The remaining three prehistoric sites, 16SMY40, 16SMY154, and 16SMY153, occur within the swamp and marsh immediately surrounding Bayou Sale. The two historic sites, 16SMY66 and 16SMY132, also occur within the natural levee terrane (Kuttruff et al. 1993:21).

Both 16SMY66 and 16SMY132 are associated with North Bend Plantation (see Chapter 4). The comparatively well-drained and light soils of the front slope and crest of the natural levees provided a good venue for settlement and agriculture, and Bayou Sale permitted relatively easy transport. Although Louisiana is sub-optimal for sugar agriculture in terms of climate and soil drainage (Sitterson 1997:216), St. Mary Parish included some of the best land in the state for cane cultivation. Consequently, all arable land within the Parish, including both banks of Bayou Sale, was developed as sugar plantations by the antebellum period.

CHAPTER 3 PREHISTORY OF THE ATCHAFALAYA BASIN

Introduction

The Atchafalaya Basin is a unique, circumscribed, alluvial floodplain. The optimal locations for occupation by prehistoric peoples in and around the Atchafalaya Basin were the natural levees. These areas were preferred because they provided optimum soil drainage, natural resource availability, proximity to transportation routes, and protection from natural hazards (Smith et al. 1986:73). As expected, archeological research to date indicates that these natural levees contain at least 40 percent of the known sites. Smith et al. (1986:73) reported that 22 of 55 sites reported were located on natural levees; suggesting that prehistoric peoples located their more permanent settlements on natural levees.

A review of the geomorphological data indicates that the current survey area is composed primarily of natural levee deposits related to the Maringouin and Teche delta complexes. Prior to being buried by the Teche complex, the Maringouin complex distributaries were exposed for hundreds of years and could have accumulated archeological deposits during Archaic times. However, as noted above, any cultural deposits on the Maringouin natural levee surface in the project vicinity would be deeply buried (>2.4 m). Consequently, the earliest cultural deposits expected within the project area date to Tchefuncte or later and would be associated with the Teche complex.

Tchula Period (500 B.C.-A.D. 1)

In the Lower Mississippi River Valley, this period is characterized primarily by widespread pottery manufacture, and the integration of food production. Also notable during this period is an increase in population as well as inter-regional relationships. Originally defined in southern Louisiana (Ford and Quimby 1945), these developments exist in the southern portion of the valley in an archeological culture called Tchefuncte (Weinstein and Kelley 1992). Ceramics are the diagnostic artifacts of this as well as most of the succeeding prehistoric cultures. Pottery attributed to Tchefuncte occupations has a seemingly non-tempered, laminated paste, probably due to minimal preparation of the raw clay before firing. Other attributes frequently associated with Tchefuncte pottery are podal supports and jab-and-drag incising (Kelley 1989:19). Common decorations appearing on these vessels include punctations, fabric and cord impressions, narrow and wide line incisions, and simple rocker stamping (Goodwin et al. 1990:25). The dominant Tchula period ceramic types are Tchefuncte Plain, Tchefuncte Incised, Tchefuncte Stamped, Lake Borgne Incised, Orleans Punctated, Tammany Punctated, Alexander Incised, and Alexander Pinched (Toth 1988:23).

Tchefuncte culture sites in the Atchafalaya Basin are commonly composed of shell middens and often contain intact organic remains. The faunal assemblage from Morton Shell Mound (16IB3), a Tchefuncte culture site in Iberia Parish, indicates that deer, alligator, raccoon, goose, and catfish were utilized as the primary sources of protein. Botanical remains included hickory nuts, acorns, plums, grapes, persimmons, squash, and gourd. The latter two may be indicative of plant domestication (Neuman 1984:119). Tchefuncte settlements tend to be located along slow, secondary streams that drain bottomlands, in littoral settings, or near floodplain lakes (Neuman 1984; Goodwin et al. 1990:25).

In Louisiana, four regional phases, including the Pontchartrain phase (500-250 B.C.), the Beau Mire phase (250 B.C.- A.D. 1), the Lafayette phase (500 B.C.-A.D. 1), and the Grand Lake phase (500 B.C.-A.D. 1), represent Tchefuncte sites (Goodwin et al. 1990). In the vicinity of the current survey area, Gagliano et al. (1975) identified a shell lens in the bank of

the Gulf Intracoastal Waterway (GIWW) containing "Tchefuncte-like" pottery. The site was designated the North Bend site (16SMY132), and it is located on the north bank of the GIWW between Bayou Sale and the Bayou Sale west levee in the shore fronting the Cabot Carbon Company plant (LA State Site Files). Cultural features associated with the site include two layers of shell. The uppermost layer is attributed to levee construction, and the lower lens is defined as prehistoric. The presumed function of the site is a Tchefuncte camp. Site testing was recommended by Gagliano et al. (1975) in the event of dredging or expansion of the waterway. It should be noted however, that NRHP testing at the North Bend Site (16SMY132) indicates that the site consists of the remains of portions of the North Bend Plantation, a late-nineteenth- and early-twentieth-century sugar estate (Kuttruff et al. 1993:3). Kuttruff et al. (1993:3) mention that the site was originally reported as a *Rangia* shell midden containing prehistoric materials, however, they describe the redefined site area as the plantation and its associated buildings. No evidence of prehistoric activity was found during site testing (Carl Kuttruff, personal communication to Braud 1997).

Marksville Period (A.D. 1-400)

The Marksville culture of the Lower Mississippi Valley is believed to have participated in an extensive interregional exchange network commonly labeled the Hopewell Interaction Sphere (Caldwell and Hall 1964). The primary focus of this interregional exchange network was among various societies inhabiting the Ohio and Illinois River valleys (Hudson 1976:72; Hunter et al. 1995:23; Stoltman 1978:721). These groups acquired and traded various exotic raw materials which included copper, marine shells, mica, obsidian, and sharks' teeth. Different theories have been offered in an attempt to explain this interaction. Most emphasize either an economics or a combination of economic and socio-religious factors; but the exact nature of the interaction sphere remains problematical. Most often, finished products made from exotic materials were recovered from burials placed in conical earthen mounds. In addition to these burial mounds, Hopewellian societies constructed large earthworks which were circular, octagonal, square, and zoomorphic (Hunter et al. 1995:23; Kelley 1989:20; Neuman 1984:140-142; Toth 1988:211-212).

Toth (1988:211-212) has argued that Marksville culture developed out of the preceding Tchula period Tchefuncte culture as a result of intermittent contacts with the societies occupying the Ohio and Illinois valleys. He emphasizes the evidence for interaction is limited solely to certain aspects of Marksville ceramic traditions and mortuary practices, but his interpretation of the nature of interregional interaction is speculative (Hunter et al. 1995:23). Subsistence and economic data from Marksville period sites are relatively non-existent. Information gathered for sites in the midwest (Asch et al. 1979) indicate intensive collection of wild plant foods and faunal resources complemented by horticultural practices revolving around native and tropical cultigens. Maize is believed to be lacking or of only minor importance at this time.

Located south of Morgan City in the vicinity of the project area are the Bone Point (16SMY39) and Oak Chenier (16SMY49) sites. These sites yielded Marksville-like artifacts, principally ceramic sherds. The Bone Point site is located on a natural levee on the right descending bank of Bayou Shaffer at the former junction of Bayou Shaffer and Bayou Penchant. Gibson (1982:410-412) reported that the cultural material was not *in situ*, and that the shell midden was a recent development. The Oak Chenier site is a *Rangia*/earth midden located on the right descending side of Bayou Chene on the south shore of Avoca Island Lake. This site was recorded by Gibson et al. (1978:127-132), and its assemblage is reported to contain Marksville ceramics. It should be noted, however, that the site form indicates a cultural affiliation for each of these sites as Troyville/Coles Creek with no reference to a Marksville component (LA State Site Files). Initially identified as Troyville in age, these sites

have been reassigned to the late Marksville period on the basis of revised ceramic analysis (Weinstein and Kelley 1992:35).

Baytown Period (A.D. 400-700)

Most aspects of the Baytown period are poorly understood, which has led some archeologists to characterize this period as an era of cultural decline following the Hopewellian florescence (Griffin 1967:187; Phillips 1970:901). However, there are indications that this period may in fact be a time of population growth and increased social integration (Braun 1977; Styles 1981). As with most post-Archaic cultures in the Lower Mississippi Valley, more is known about the ceramics produced by these groups than other aspects of their lifeways (Kidder 1993:13-18). Even though available evidence is relatively scarce, it does suggest that Baytown period habitation sites are either small hamlets or large communities with mounds (Kidder 1993:18). Kidder (1993:18) notes that grave goods, although rare at Baytown period sites, were often elaborate and seem to support his contention of little differentiation of status at these sites. Moreover, Kidder (1993:18) indicates Baytown period subsistence is probably a continuation of earlier Marksville hunter-collector patterns. During this period, changes in the stone tool tradition reflected a transition from the atlatl to the bow and arrow. Dart points were replaced by small arrow points.

The Whitehall site (16LV19) on the Amite River exists as the sole representative of the Whitehall phase (A.D. 400-700) in southeast and south-central Louisiana. However, strong Baytown components have been identified at the Gibson Mounds (16TR5) (Weinstein et al. 1978:Tables 29-30, Fig. 63; Weinstein and Kelley 1992:36). Reported ceramics from this site include Coles Creek Incised, *var. Stoner*; Evansville Punctated, *var. Amite*; French Fork lugs; Larto Red, *vars. Larto* and *Silver Creek*; Mazique Incised, *var. Bruly*; and Woodville Zoned Red, *var. Woodville* (Weinstein and Kelley 1992:36).

Coles Creek Period (A.D. 700-1200)

The Coles Creek period was at one time considered to be part of a broadly defined Troyville period (Neuman 1984). However, Troyville and contemporaneous cultures are now treated as regional variants within the Baytown period. Many Coles Creek mound sites, which typically consist of a group of mounds around a plaza, appear to be built over earlier Baytown period platform mounds (Kidder 1993:22).

The cultural developments of the Coles Creek period are impressive and appear to establish the foundation on which later Plaquemine and Mississippi cultures were built. The development of substantial platform mounds, in the form of truncated pyramids, shows an ability to organize the labor needed for large earth-moving projects. Larger sites have several mounds clustered around a plaza. Mortuary or temple structures stood on the mound summits.

The current consensus of opinion among archeologists is that the Coles Creek period represents the rise of chiefdom-level societies in the Lower Mississippi Valley. However, the emergence of social rank and of regional political centers seems to occur only at the end of the period (Kidder 1992:29-30; Steponaitis 1986:386; Woodiel 1993:121; Nassaney and Cobb 1991:302-306). Belmont (1985:276-278) at one time framed a model for Coles Creek settlement that hypothesized secondary mound sites arranged around a principal center. Currently this model seems to owe more to incomplete recording of Coles Creek sites than it does to actual settlement pattern.

Similarities to the Weeden Island culture of northwest Florida can be seen in the Lower Mississippi Valley cultural florescence occurring during this time period. Community patterns such as the construction of small mounds around plazas indicates the stratification of social

systems during this period. Incised, stamped, and punctated pottery types with decorative restrictions around the rim of the vessel are distinctive of both culture periods (Weinstein and Kelley 1992:37).

Within the general study area, there are three temporally sequential phases for the period: Bayou Cutler (A.D. 700-800), Bayou Ramos (A.D. 850-1000), and St. Gabriel (A.D. 1000-1200). Ceramic types and varieties serve as phase designations. The Bayou Cutler phase is recognized by Coles Creek Incised, *vars. Coles Creek* and *Athanasio*; Mazique Incised, *var. Mazique*; Pontchartrain Creek Stamped, *var. Pontchartrain*; and French Fork Incised. Bayou Ramos ceramics include Avoyelles Punctated, *var. Avoyelles*; Beldeau Incised, *var. Beldeau*; Coles Creek Incised, *var. Mott*; Mazique Incised, *var. Kings Point*; and Pontchartrain Check Stamped, *var. Tiger Island*. St. Gabriel phase ceramics include Harrison Bayou Incised, *var. Harrison Bayou*; Coles Creek Incised, *var. Hardy*; Mazique Incised, *var. Manchac*; and Evansville Punctated, *var. Wilkinson* (Weinstein and Kelley 1992:37).

Mississippi Period (A.D. 1200-1700)

The Mississippi period, was the final prehistoric period in eastern North America. There are two interpretations of the relationships between Coles Creek, Plaquemine, and Mississippian groups in the Lower Mississippi Valley. Phillips (1970) believed the Plaquemine culture developed from the Coles Creek, with interaction between Plaquemine and Mississippian cultures resulting in changes in the resident population. In time, Mississippian groups entered the area and displaced the resident groups. Brain (1978), however, maintains that the resident Coles Creek population became Plaquemine as the result of contact with Mississippian groups. Mississippian influence continued to increase, in time displacing the characteristics of the resident groups.

There has been considerable debate over the nature of the Plaquemine to Mississippian transition. Most notably, there is some doubt about the diffusion of Mississippian traits to Plaquemine populations. Kidder (1993) indicates that the notion of Mississippian diffusion fails to explain many of the cultural traits of the Plaquemine culture. However, there was clearly a diffusion of certain traits, such as the use of shell tempering in ceramics, and new patterns in domestic architecture (Kidder 1993:27). Political consolidation and the emergence of a religious elite are also contributed to Mississippian influences. Mound sites became less scattered but larger, while non-mound sites were smaller but more numerous.

Plaquemine culture provides the first definite evidence for a ranked society in the late prehistoric period (Kidder 1992:29-30). In many parts of the Southeast, there appears to have been a hierarchy of sites. Special purpose camps and farmsteads were scattered throughout the region. The latter were sites where nuclear and extended families lived in small huts and cultivated maize, beans, and squash. The diet was based primarily on the consumption of cultivated plants, but it also included the use of game and wild plants. Many of the scattered farmsteads appear to have been oriented toward mound centers. Excavations have shown that these centers were occupied for long periods, and that the mounds supported structures and were surrounded by palisades. The groups appear to have had chiefdom-level political systems. There was differential access to goods, and some sites evidence specialization in the production of certain classes of material goods.

The Louisiana coastal zone experienced cultural change and variation similar to the rest of the Lower Mississippi Valley. As mentioned above, the Plaquemine culture (ca. A.D. 1200) appears throughout the region. Large mound sites such as Gibson (16TR5), and the Berwick Mounds (16SMY184) are likely representatives of major Plaquemine centers (Weinstein and Kelley 1992:38). Smaller sites represented by isolated mounds probably indicate the presence of minor villages. Plaquemine components are exemplified in numerous shell

middens possibly serving as seasonal collecting locales for the inhabitants of the larger mound sites (Altschul 1978; Gibson 1978; McIntire 1958; Weinstein et al. 1978; Weinstein and Gagliano 1985; Weinstein and Kelley 1992).

The Medora site (16WBR1) in West Baton Rouge Parish is the type site of the Plaquemine culture. The Medora phase (A.D. 1200-1500), established by Gagliano (1967) based on Qumiby's (1951) excavations of the Medora site is one of the early Plaquemine period phases in the region (Weinstein and Kelley 1992:39). The second two phases represented in the area are the Barataria phase (A.D. 1200-1500) and the Burk Hill phase (A.D. 1200-1600); all three phases are identified on the basis of ceramic type and variety.

Also during this time period, evidence of the so-called "Southern Cult" is represented primarily by cult designs which occur on pottery in the Barataria phase (Holley and DeMarcay 1977:16; Weinstein 1987; Weinstein and Kelley 1992:39). This, in addition to the distribution of shell-tempered pottery, suggests an eastern Gulf coast origin occurring around Mobile Bay (Gagliano et al. 1975:27; Weinstein et al. 1978:8).

By approximately 1500 A.D., the material culture of the aboriginal groups in the Louisiana coastal zone appeared similar to that encountered by the early French explorers. The Delta Natchezan phase (A.D. 1500-1700) was created by Phillips (1970) to include all of south Louisiana with ceramics similar to the protohistoric and historic Natchez. Bayou Goula (16IV11), the type site for this phase, is the assumed location of the historic Bayougoula (Weinstein and Kelley 1992:39). A small amount of shell-tempered pottery including Addis Plain *vars.* *Greenville* and/or *St. Catherine* may be associated with the Delta Natchezan phase. However, the principal ceramic markers include Fatherland Incised, *vars.* *Fatherland* and *Bayou Goula* (Quimby 1957:121-128; Brain 1969; Brown 1985; Phillips 1970; Steponaitis 1974; Weinstein and Kelley 1992:39).

CHAPTER 4

HISTORIC LAND USE WITHIN THE PROJECT AREA

The current research suggests that chain of title presented by Kuttruff et al. (1993) for the 16SMY66 area may be in error. The project area is located within Section 4 of T16S R10E, adjacent to the relict channel of Bayou Sale, which constituted the boundary of Sections 3 and 4. Contrary to previous chain of title documentation, Sections 3 and 4 in T10S R16E were evidently not part of North Bend Plantation prior to the purchase of an adjoining plantation in 1906. St. Mary Parish records are organized in an unorthodox fashion, are not complete for the period prior to ca. 1845, and descriptions of property locations were frequently imprecise in the antebellum period. Since numerous antebellum landowners held more than one tract on Bayou Sale, it is difficult to arrive at a definitive chain of title for the relevant sections. Chain-of-title research and a comparison of the *U.S. Land Survey Plats* for St. Mary Parish, the *Official Map of the Parish of St. Mary, Louisiana* (Waddill 1893), and modern USGS quadrangle maps indicate clearly that the boundaries of antebellum and later plantations did not correspond neatly to U.S. survey section lines, complicating the documentation of land ownership in the project area.

Contradictory information is available concerning the original U.S. claimant of Sections 3 and 4. Kuttruff et al. (1993) state, on the basis of Attakapas District records (Sanders 1962:60), that the original U.S. claimant of Sections 3 and 4 was Dominique Prévost (Kuttruff et al. 1993:40). Prévost's Spanish grant to these sections may have been received before 1801 (Sanders 1983:37). However, Prévost sold Sections 3 and 4 to John Reeves, whom the *U.S. Land Survey Plats* for St. Mary Parish indicate was the original U.S. claimant of Sections 3 and 4. Reeves probably purchased these sections prior to 1811 and definitely before 1814, since Prévost's succession includes no Bayou Sale properties (Kuttruff et al. 1993:41).

Kuttruff et al. (1993) apparently assumed that Sections 3 and 4 in T16S R10E were conveyed with the sections above them that eventually became North Bend Plantation. This does not appear to be correct, but definitive documentation of the disposition of these sections is difficult to achieve. In 1811, Dominique Prévost sold a total of 3,385 superficial arpents on Bayou Sale to Henry Johnson and Nathan Kemper. According to James Kemper (1981:20-21), Nathan Kemper received the lower two sections of Dominique Prévost's property and Henry Johnson the upper two. If this was the case, then on the basis of the *U.S. Land Survey Plats*, Johnson should have received Sections 59 and 60 in T15S R10E, and Kemper received Sections 1 and 2 in T16S R10E, but not Sections 3 and 4 in this township and range. In addition, an undated *Map of a Portion of T15S R10E, Showing Original Government Entries* in the St. Mary Parish Clerk of Court's Office, indicates that the lowerline of Johnson's portion of the Prévost tract was above the T15S-T16S line. This suggests that Kemper's tract was larger than just Sections 1 and 2 in T16S R10E, and contained part of Sections 59 and 60 in T15S R10E. He may have acquired part or all of the Johnson tract, since at his death, Nathan Kemper's tract supposedly measured 25 arpents on Bayou Sale (MB 9:372). Nathan Kemper's tract was divided up into nine or more lots at his death and subdivided among a number of heirs at his succession in 1838 (MB 9:372). These lots were, evidently, irregularly shaped.

On April 12, 1839, Jane Kemper Splane, one of the heirs of Nathan Kemper, sold a tract of 222 arpents to Carroll M. Vinson (MB 9:389). Below this tract, and the lower neighbor of Kemper's plantation on Bayou Sale at the time his death, was a tract owned by Daniel S. Norton. Norton's tract may have contained a portion or even all of Sections 1 and 2 in T16S R10E (MB 9:372; MB 9:389; MB 10:77). On February 1, 1840, Daniel S. Norton sold his property on Bayou Sale to James B. Vinson (MB 10:77). Thus, it appears that by 1840, two tracts above the upperline of Sections 3 and 4 were owned by two of the Vinson brothers. In June 1841, Michael Gordy purchased James Vinson's tract (MB 10:343); Gordy also owned

Sections 3 and 4 between 1830 and 1832 (see below). However, the upperline of the tract containing Sections 3 and 4 remained above the T15S/T16S line.

John Reeves, the original U.S. claimant of Sections 3 and 4 in T16S R10E, appears as a St. Mary Parish resident in the 1810 and 1820 U.S. censuses. In 1817, John Reeves exchanged a 10-arpent front tract on Bayou Sale for 1280 acres on Bayou Vermilion owned by Rufus Nicholson (MB B-A:233). Subsequent conveyances indicate that this tract was in T16S R9E, and did not involve the current project area. By 1830, Reeves had evidently moved to Lafayette Parish. John Reeves died in late 1830 or January 1831 (COB C:247). On April 22, 1829, Charles C. Reeves and his partner Baldwin Mallett had sold a 20 arpent tract of vacant land on Bayou Sale to Francis A. Bynum (COB C:1). This may be a relative of John Reeves in partnership with Mallett. It is likely that John Reeves acquired a portion of Sections 2 and 6 from Terence Leblanc or a successive owner prior to 1829, and that these (perhaps 10 to 14 arpents) together with Sections 3 and 4 (approximately 6 arpents front) comprised John Reeves' 20 arpent frontage on Bayou Sale. This is probably the tract purchased by Bynum in 1829. However, no record of Bynum as vendor of this tract could be located. It is possible that Bynum failed to meet sale or mortgage terms, since in January 1830, the 20 arpents held by Reeves and Mallett on Bayou Sale was seized by the Sheriff and sold to Michael Gordy for \$2,268 (COB C:62).

It is possible that Charles C. Reeves and Joseph Reeves were the sons of John Reeves, and that the elder Reeves had intended to divide his Bayou Sale properties between them. These properties were evidently not contiguous. In John Reeves' succession in January 1831, two adjacent tracts totaling 16 arpents front on Bayou Sale (plus tracts on Bayou Teche) were conveyed to Joseph Reeves (COB C:247). It is highly unlikely that these two tracts included Sections 3 and 4, since they were almost certainly seized from Charles Reeves and Baldwin Mallett and sold to Michael Gordy in 1830. On May 18, 1832, Joseph Reeves sold a 6-arpent front tract on Bayou Sale to J.D. Wright (COB C:448); this tract was located above the project area. No other conveyances with Joseph Reeves as vendor could be located.

Meanwhile, the disposition of the relevant Reeves and Mallett tract is accounted for. On January 27, 1832, Michael Gordy sold a 20-arpent front tract on Bayou Sale to Joseph Berwick for \$4,000 (COB C:362). This tract was bounded by Alexander Splane above and therefore very probably consisted of Sections 3 and 4 and additional area. On the same day, Joseph Berwick conveyed the lower 10 arpents of this tract to his son Nathan Berwick (COB C:395). Between 1832 and 1837, this 10-arpent front tract held by Nathan Berwick was acquired by Carroll M. Vinson, husband of Helena Berwick; on December 19, 1834, Joseph Berwick conveyed the upper 10 arpents of this tract to another son, David Berwick, who sold his 10 arpents to C.M. Vinson on October 21, 1837 (MB 9:63).

On April 8, 1840, Carroll M. Vinson sold a one-half undivided interest in his 20-arpent front Bayou Sale plantation to Stokely Vinson of Sumner, Tennessee, for \$8,000 (MB 10 #4795). This 20-arpent front tract is almost certainly the Reeves and Mallet tract; supporting this contention is that 1840 conveyance lists the upper neighbor of Carroll Vinson's 20-arpent tract as James B. Vinson, who had purchased the Daniel S. Norton parcel, part of the Kemper tract, in February 1840 (MB 10:77). Sugar production figures for the Carroll M. Vinson tract for the years 1844 and 1846 are given in Table 1. Stokely Vinson sold his one half-interest in the plantation to James Campbell of Rapides Parish on October 28, 1846 (MB 16:250). Sugar production figures for the plantation during the Campbell & Vinson partnership (1851-1853) are also provided in Table 1.

On January 21, 1847, Carroll M. Vinson's one-half interest in the Bayou Sale plantation was sold by his wife, Eleanor Berwick Vinson, to William A. Douglas. A year later, on February 3, 1848, William A. Douglas sold his interest in the Bayou Sale "sugar plantation" to

Stokely Vinson for \$14,500 (MB13:221), and the 20-arpent front tract including Sections 3 and 4 became known as the Stokely Vinson Plantation. Vinson sold a one-half interest in the plantation to Lorenzo D. Vinson on February 3, 1849 (MB13:429). For a time, Stokely Vinson did not have ownership of the plantation, but purchased a one-half interest in the plantation back from James Campbell on April 2, 1853 (MB16:250). Stokely Vinson resided on this Bayou Sale plantation until 1867, and his name was long associated with the tract. Sugar production at the Stokely Vinson plantation for the years 1854-1862 are given in Table 1. The sugar mill at Vinson's sugar house remained horse-powered through the antebellum period. Vinson's best year of production was the state-wide banner crop year of 1854, when he produced 253 hogsheads of sugar (Champomier 1854).

After the Civil War, Stokely Vinson, like many planters, fell upon financial difficulties. As a result of a sheriff's seizure, the Stokely Vinson plantation was sold on May 8, 1867, to Adelard Carlin for \$11,350 (COB P:235). Carlin, another Bayou Sale plantation owner, held the former Vinson plantation only a short time, selling it on July 3, 1868, to William Phillips for \$12,000 (COB P:548). Phillips operated the plantation in partnership with Vinson for a couple of years, and at this time the old wooden sugar house and horse-powered mill were replaced by a steam mill in a brick sugar house with shingled roof. The old open-kettle train was retained, and in fact, this plantation never switched to the more modern vacuum-pan process. As a result of a suit between William Phillips and his wife, Sarah Lester Phillips, Mr. Phillips' property was seized. Mrs. Sarah Lester Phillips acquired title to the former Stokely Vinson Plantation on August 5, 1871, for a bid of \$16,000 at the Sheriff's public sale (COB Q:675). Mrs. Lester sold the sugar plantation on August 15, 1873, to Jules Lapène (COB 25:599).

Lapène changed the name of the former Vinson plantation to "Bayou Sale" Plantation, by which it was known until 1894. After 1879, Lapène no longer managed the plantation. In 1880, the operators were Bush & Levert; in 1881-1882, B.F. Quinn; and in 1883, the plantation was leased by S.A. Strickland (COB W:121; Bouchereau 1880-1883). During 1880-1883, the cane production of the Bayou Sale Plantation was sold to North Bend Plantation. On April 11, 1883, Lapène conveyed the plantation to John Calder, a resident of New Orleans, for \$12,000. Calder formed a partnership with Lapène (COB V:305). However, T.S. Easton operated the plantation in 1885-1886, and James Lunny in 1887-1888. Around 1887 or 1888, the sugar house may have burned, since the brick building was replaced by a wooden one. Calder died ca. 1889, and the plantation was managed for several years by his estate (Table 1).

James Lunny returned as operator of the former Vinson plantation in 1893 and remained until 1900. Lunny changed the name of the plantation to "Daisy." No sugar production figures are given by Bouchereau for this plantation after 1892, and it is probable that the cane produced there was sold to a neighboring plantation. In late 1895, the 20-arpent front "sugar plantation" was conveyed to John Calder heirs John H. Calder and Mrs. Emily Calder Shrill (COB FF:148). In 1900, the St. Mary Planting Co. Ltd., became the owner and operator of the Daisy Plantation, which they renamed "St. Mary" Plantation (Bouchereau 1900). In 1902-1903, St. Mary Plantation was operated by the partnership of O'Neil, Landen, and Borah. The plantation figured in the suit of John Baldwin Jr. vs. O'Neil, Landen, & Borah, and in the resulting Sheriff's sale was conveyed to J.B. Rodriguez on February 25, 1905 (COB SS:485). The plantation was transferred the same day to Charles O'Neil (COB SS:488), who operated the plantation in 1904. On March 11, 1905, an undivided one-half interest was conveyed by O'Neil to J.B. Rodriguez (COB PP:502). St. Mary Plantation was operated by the North Bend Sugar Co. in 1905. The following year, on September 1, 1906, the plantation was acquired from Rodriguez and O'Neil by the North Bend Sugar Refining and Manufacturing Co., Ltd. (COB VV:258).

North Bend Plantation had been combined with Midway Plantation, further down Bayou Sale, by Savante M. Swenson in 1875 (COB S:154). In 1881, Swenson acquired a railroad right-of-way through the former Stokely Vinson Plantation, on the east side of Bayou Sale, for a plantation railway (COB ZZ:554). This track was later a spur line of the Southern Pacific Rail Road, and is now the route of Louisiana Highway 317. Swenson had also acquired Lone Magnolia Plantation, adjacent to and below the Stokely Vinson Plantation, in 1886 (COB W:577). Between 1875 and 1886, Swenson may have had a map drawn showing the boundaries of his North Bend and Midway plantation tracts; this earlier map may have formed the basis of a 1924 map of the J.M. Burguières Co. properties (*Map Book*, COCO, SMP). This map indicates the "North Bend Unit" and the "Midway Unit" but gives no hint that Stokely Vinson and Lone Magnolia were owned by Burguières, which they were after 1910 (as discussed below). This map clearly shows North Bend Plantation encompassing most, but not all, of Section 1 and the eastern end of fractional Section 4 in T16S R10E. As indicated on this map, the current project area is not within the boundaries of North Bend Plantation.

On January 31, 1910, the North Bend Sugar Refining and Manufacturing Co. sold their Bayou Sale properties to the partnership of the J.M. Burguières Co., Ltd., and the Segura Sugar Co., Ltd. (COB ZZ:554). The J.M. Burguières Co. had evidently begun operating the St. Mary Plantation the year before, together with the other North Bend Sugar Co. plantations on Bayou Sale. Conveyed together in 1910 were North Bend Plantation, Stokely Vinson Plantation, Lone Magnolia Plantation, and Midway Plantation.

The 1910 conveyance (COB ZZ:554) provided a description of the portions of Sections 3 and 4 in T16S R10E that were included in North Bend Plantation at that time. These were the southern one-half of the southwestern one-quarter of Section 3 and the southeastern one-quarter of the southeastern one-quarter of Section 4. This does not concur with the depiction of property lines on the above-referenced map of 1924, but the current project area is contained in neither of these areas within North Bend Plantation. However, it appears that the area of Sections 3 and 4 near Bayou Sale were developed in support of the large sugar refinery complex constructed nearby in T15S R10E, Sections 1 and 2. A map of the *North Bend Drainage District*, dated July 1, 1916 (Figure 5), shows a quarters complex of 17 houses in Section 4, and an additional 5 houses across Bayou Sale in Section 3. Although it cannot be stated definitively, it is likely that this quarters complex is not a product of the antebellum period but rather was constructed after the consolidation of the former Stokely Vinson Plantation with North Bend Plantation in 1905. The 1924 Burguières property map, while showing the pre-1905 property lines, also shows the same quarters houses in the same locations as the 1916 map. The houses extended very approximately 750' south from the Section 1/Section 4 boundary. From a Corps of Engineers drawing reproduced in Kuttruff et al. (1993:59) showing the impact area of the Intracoastal Waterway (constructed ca. 1930), it appears that probably four of these quarters houses were located on the southern side of the waterway, east of the Bayou Sale channel.

The J.M. Burguières Co. continued to own Sections 3 and 4 in T16S R10E into recent decades (Tobin 1960; Kuttruff et al. 1993:43).

The Intracoastal Waterway

An important alteration to the landscape in the vicinity of the project area was the construction of the Intracoastal Waterway. As early as 1873, the U.S. Congress authorized a survey from the Mississippi River to the Rio Grande to select a suitable route for an inland waterway connecting the two rivers, but no plans were approved or action taken for over 30 years. In 1905, Congress authorized preliminary plans for a waterway from the Mississippi to the Rio Grande to be prepared by Major Edgar Jadwin of the U.S. Army Corps of Engineers.

Table 1. Sugar Production at Plantations Encompassing Sections 3 and 4 in T16S R10E (from Champomier 1844-1862 and Bouchereau 1868-1917).

YEAR	PLANTATION OWNER/ OPERATOR	HOGS- HEADS	SUGAR HOUSE DESCRIPTION	PLANTATION NAME
1844	C.M. Vinson	122		
1846	C.M. Vinson	165		
1850	Stokely Vinson	82		
1851	Campbell & Vinson	95	horse	
1852	Campbell & Vinson	135	horse	
1853	Campbell & Vinson	145	horse	
1854	Stokely Vinson	253	horse	
1855	Stokely Vinson	217	horse	
1856	Stokely Vinson	145	horse	
1857	Stokely Vinson	35	horse	
1858	Stokely Vinson	173	horse	
1859	Stokely Vinson	226		
1860	Stokely Vinson	63		
1861	Stokely Vinson	126		
1862	Stokely Vinson	185		
1869	--			
1870	Philips & Vinson	76	horse & kettles, wood	
1871	Philips & Vinson	110	steam & kettles, brick & shingles	
1872	Lewis Philips	50	steam & kettles, brick & shingles	
1873	Est. Wm. Philips	60	steam & kettles, brick & shingles	
1874	Est. Wm. Philips	50	steam & kettles, brick & shingles	
1875	Est. Wm. Philips	--	steam & kettles, brick & shingles	
1876	Jules Lapène	--	steam & kettles, brick & shingles	Bayou Sale
1877	Jules Lapène & Co.	54	steam & kettles, brick & shingles	Bayou Sale
1878	Jules Lapène & Co.	75	steam & kettles, brick & shingles	Bayou Sale
1879	Jules Lapène & Co.	90	steam & kettles, brick & shingles	Bayou Sale
1880	Bush & Levert	sold to S.M. Swenson	steam & kettles, brick & shingles	Bayou Sale
1881	B.F. Quinn	sold 1954 tons to S.M. Swenson	steam & kettles, brick & shingles	Bayou Sale

Table 1, Continued.

YEAR	PLANTATION OWNER/ OPERATOR	HOGS- HEADS	SUGAR HOUSE DESCRIPTION	PLANTATION NAME
1882	B.F. Quinn	sold 1749 tons to North Bend	steam & kettles, brick & shingles	Bayou Sale
1883	S.A. Strickland	sold 1573 tons to North Bend	steam & kettles, brick & shingles	Bayou Sale
1884	John Calder & Co.	148	steam & kettles, brick & shingles	Bayou Sale
1885	T.S. Easton	110	steam & kettles, brick & shingles	Bayou Sale
1886	T.S. Easton et al.	60	steam & kettles, brick & shingles	Bayou Sale
1887	James Lunny	30	steam & kettles, brick & shingles	Bayou Sale
1888	James Lunny	150	steam & kettles, wood	Bayou Sale
1889	Est. John Calder	160	steam & kettles, wood	Bayou Sale
1890	Est. John Calder	96	steam & kettles, wood	Bayou Sale
1892	David R. Calder	--	steam & kettles, wood	Bayou Sale
1893	James Lunny	--	steam & kettles, wood	Bayou Sale
1894	James Lunny	--	steam & kettles, wood	Bayou Sale
1895	James Lunny	--	steam & kettles, wood	Daisy
1896	James Lunny	--	steam & kettles, wood	Daisy
1897	James Lunny	--	steam & kettles, wood	Daisy
1898	James Lunny	--	steam & kettles, wood	Daisy
1899	James Lunny	--	steam & kettles, wood	Daisy
1900	James Lunny/St. Mary Planting Co. Ltd.	--	steam & kettles, wood	Daisy
1901	St. Mary Planting Co. Ltd.	--	steam & kettles, wood	St. Mary
1902	O'Neil, Landen, & Borah	--	steam & kettles, wood	St. Mary
1903	O'Neil, Landen, & Borah	--	steam & kettles, wood	St. Mary
1904	O'Neil, Landen, & Bo- rah/Charles O'Neil	--	steam & kettles, wood	St. Mary
1905	North Bend Sugar Co.	--	steam & kettles, wood	St. Mary
1906	North Bend Sugar Co.	--	steam & kettles, wood	St. Mary
1907	North Bend Sugar Co.	--	steam & kettles, wood	St. Mary
1908	North Bend Sugar Co.	--	steam & kettles, wood	St. Mary
1909	J.M. Burguières Co.	--	steam & kettles, wood	St. Mary
1913	J.M. Burguières Co.	--	steam & kettles, wood	St. Mary
1914	J.M. Burguières Co.	--	steam & kettles, wood	St. Mary
1915	J.M. Burguières Co.	--	steam & kettles, wood	St. Mary
1916	J.M. Burguières Co.	--	steam & kettles, wood	St. Mary
1917	J.M. Burguières Co.	--	steam & kettles, wood	St. Mary

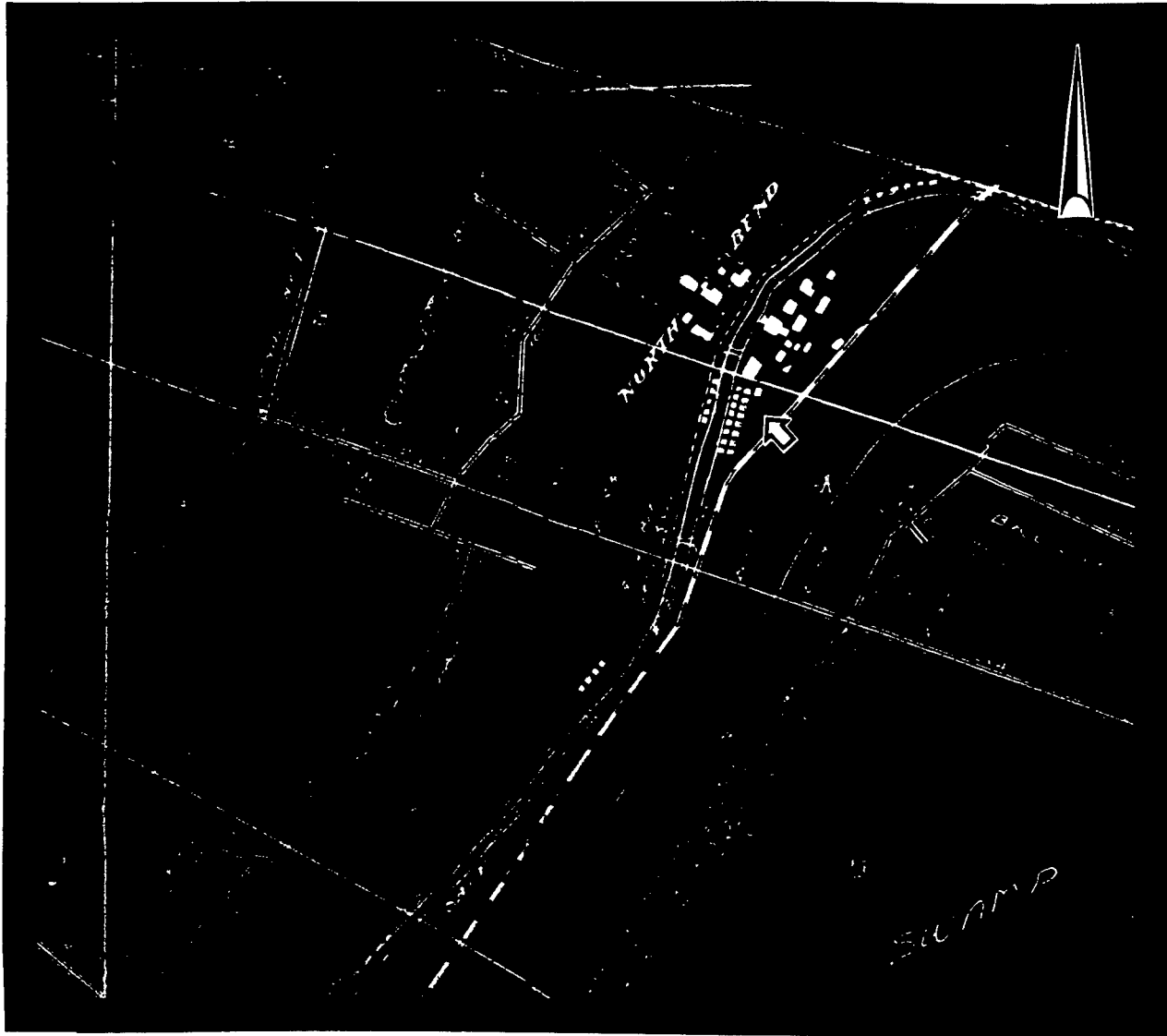


Figure 5. Excerpt from *North Bend Drainage District* map, 1916. The arrow indicates the project study area (COCO, SMP).

Jadwin proposed a waterway 5' deep and 40' wide, stringing together natural waterways and bodies of water, and Congress authorized construction of a waterway this size between Franklin, Louisiana, and the Mermentau River. Construction may have begun on portions of Jadwin's proposed route, but a new survey for a continuous waterway between St. George Sound, Florida, to the Rio Grande was approved by Congress in 1909. This same year, the Plaquemine Lock was finished, completing an inland waterway route from the Mississippi River to Morgan City, but work west of Morgan City appears not to have been completed. The River and Harbor Act of June 25, 1910, authorized construction of several channels, but not the portion of the modern GIWW route between the lower Atchafalaya and the Mermentau River. This part of the route was bypassed. In 1925, the U.S. Government purchased the Hanson Canal, connecting Bayou Teche to Bayou Bartholomew and ultimately, to Cypremort Bay. Thus, this route also bypassed Bayou Sale. Other purchases at this time were the Harvey Lock and the Company Canal, which created a continuous Federally-owned waterway from the Mississippi to the Sabine River (USCGS 1925; USACOE 1936:12; 1948:2; 1950:1-2).

The next stage of Intracoastal Waterway construction involved the stretch between the Sabine River and the Atchafalaya River. The GIWW channel between the Atchafalaya and Vermilion rivers (including the portion within the project area) was constructed in 1932-1933, and completed in May 1933. The original dimensions of the channel were 9' deep and 100' wide. A railroad swing bridge, a highway swing bridge, and two cable ferries (USACOE 1936:12) over the GIWW were constructed at North Bend, probably immediately after completion of the GIWW, and are shown on the 1934 USCGS Belle Isle, La., 15' quadrangle map (USCGS 1934).

The strategic value of the GIWW was recognized at the outbreak of World War II. In early 1942, Congress authorized (under the Rivers and Harbors Act of 1935) an enlargement of the Waterway from the Florida Gulf Coast to Texas. Beginning at this time, existing sections of the GIWW were enlarged and new portions constructed to a depth of 12' and a width of 125'. The work of enlarging the GIWW was performed in the Atchafalaya to Vermilion section (including the project area) between 1942 and 1948 (Hull and Hull 1967:36-37; USACOE 1948:2; 1956a:1). The 1945 aerial photographs of the project area (in Kuttruff et al. 1993:61) suggest that this portion of the GIWW had been widened to 125' by this date.

The Intracoastal Waterway was again widened, probably after 1962, but the date is uncertain. The 1964 and 1966 editions of the Navigation Maps, Gulf Intracoastal Waterway (USACOE 1956-1966) show the GIWW channel as 12' deep and 125' wide, but notes that a channel 16' deep and 200' wide had been authorized. Meanwhile, the 1966 North Bend, La., quadrangle (USGS 1966) shows the channel already widened to over 200 feet at the LA 317 bridge, and an open channel width greater than 350'. Presumably, the GIWW channel was widened and deepened about 1965 or 1966; the Navigation Maps (USACOE 1956-1966) would therefore be assumed to be incorrect and the 1966 North Bend, La., quadrangle map (USGS 1966) to be correct. Portions of the GIWW (but not the portion in the project area) are shown on the 1980 photorevision of the 1966 North Bend, La., quad to have been widened between 1966 and 1980.

Bayou Sale

Plantations had developed along Bayou Sale during the antebellum era when shallow-draft steamboats were able to ascend Bayou Sale from Bayou Sale Bay. Bayou Sale must have suffered from low water and silting problems from an early date, and it is not likely that Bayou Sale could ever have been directly entered from Bayou Teche in historic times (cf. Kuttruff et al. 1993:13). The earliest U.S. Coast and Geodetic Survey Charts from the 1850s suggest that Bayou Sale was navigable from the Bay only as far up as the general vicinity of North Bend (USCGS 1854, 1857). About 1881, S.M. Swenson built a plantation rail road transecting the

North Bend area and constructed a bridge across Bayou Sale in T16S R10E:1. The necessity of a bridge at this location indicates that Bayou Sale still held water at this date, although the Swenson bridge was unlikely to have been high enough to allow anything but small boats to pass beneath it. The right-of-way of Swenson's rail road was purchased by Morgan's Louisiana and Texas R.R prior to 1892 and converted into a standard-gauge rail spur, later owned by the Southern Pacific R.R.

An 1892 U.S.C.&G.S. chart (USCGC 1892) shows Bayou Sale Bay with a depth of only three feet and indicates that the waterway may have been navigable as far up as Gordy, if at all, by that date. This also suggests that the railway was vital to the continuation of cane growing in the area above Gordy. The current depth of Bayou Sale Bay is approximately one foot, except for a navigation channel that allows access to an oilfield canal in T17S R9E:37.

Bayou Sale at North Bend had probably long ceased to be a navigable waterway when the east and west Bayou Sale levees were constructed between 1934 and 1941, and the Bayou Sale channel was definitively severed from Bayou Sale Bay immediately below Gordy by a levee in T16S R9E:17. The 1934 Belle Isle, La., 15' quadrangle (USCGS 1934) shows that only a partial levee, at the edge of the backswamp on the east side of Bayou Sale, had been constructed in the vicinity of North Bend by that date. By 1941, the Belle Isle, La., quad (USGS 1941) shows that the east and west Bayou Sale levees had been extended below North Bend. With the sealing of the lower end of Bayou Sale and the subsequent construction of road culverts interspersed along its length, all boat traffic on the bayou was effectively blocked (Lemann Miller, West St. Mary Parish Port, Harbor, and Terminal District, personal communication to Benjamin Maygarden, April 15, 1998), and Bayou Sale was no longer classified as a navigable waterway within St. Mary Parish (St. Mary Parish Planning Board 1949:86).

The Cabot Canal Plant

The Cabot Corporation Canal Plant dominates the project area vicinity west of the Bayou Sale channel and north of the Intracoastal Waterway. The Cabot corporation was established in St. Mary Parish in 1951, and the carbon black plant in the project study area began operation in 1952. Carbon black is produced by heating a heavy hydrocarbon fuel oil to very high temperature in a reactor until it separates into carbon and various gases. The resulting carbon is used as a reinforcing agent or pigment in rubber products, roofing materials, inks, paints, and many special products. The Cabot plant originally had ten carbon black units, with an annual capacity of 132 million pounds, two gas furnace units, four oil furnace units, and four thermal units. The plant originally had total personnel of over 300 persons (Cabot Corporation n.d.:3-5).

A comparison of the 1941, 1954 and 1966 USGS quadrangles (USGS 1941, 1954, 1966) and the Intracoastal Waterway navigation maps (MRC 1956-1966) indicate how the plant altered the project vicinity and also the growth of the facility during this period. By 1941, the Southern Pacific rail line had been removed from the project area. In 1954, several of the buildings constructed at North Bend after 1934 were still present, and various plant buildings, above-ground storage tanks, etc., had been erected west of the Bayou Sale channel. The portion of the Southern Pacific Rail Road right-of-way in the project area had been adapted for a highway, then designated Louisiana Highway 60. Highway bridges replaced the old rail bridges across the Intracoastal Waterway and Bayou Sale. North of the former Bayou Sale rail bridge location, Louisiana Hwy 60 paralleled the newly-active Southern Pacific rail line. Two railroad spurs departed from the old Southern Pacific right-of-way north of the bridge to serve the Cabot plant; both were located on the west side of Bayou Sale. By 1956, LA Hwy 60 had been re-designated LA Hwy 317. Between 1954 and 1958, several barge facilities were constructed along the Intracoastal Waterway in the vicinity of the Cabot plant. The Cabot Carbon

Co. constructed a small slip on the north bank of the Intracoastal waterway immediately south of the plant and slightly east of the Bayou Sale channel, between 1954 and 1956. Cabot added a larger slip on the same bank, west of the Bayou Sale channel, between 1956 and 1958. Evidently, at about the same time (1956-1958), a small slip was excavated in approximately the relict channel of Bayou Sale on the south side of the Intracoastal Waterway opposite the Cabot plant, and within the project study area. Other slips were excavated 1956-1958 east of the project area but in proximity to the Cabot plant. The Magnolia Petroleum Co. loading dock was established on the southern bank of the Intracoastal Waterway adjacent to LA Hwy 317 on its eastern side, and the Columbian Carbon slip and dock was built north of the Intracoastal waterway east of LA Hwy. 317. With the widening of the Intracoastal Waterway ca. 1966, these slips were relocated and increased in size. By 1966, the industrial complex of the plant had greatly expanded west of Bayou Sale, and nearly all buildings of the post-1934 North Bend tract had been removed east of Bayou Sale.

The original oil-furnace reactors of the Cabot Canal Plant were replaced in 1968, and in 1974, the plant installed Special Blacks' reactors to produce special grades of carbon black to replace discontinued channel black grades. Also in 1974, the rubber units of the plant were modernized. However, in 1975, thermal units and rubber blacks units were closed down due to the cost of raw materials. After these closings, annual capacity of the plant was then 210 million pounds. Currently, the plant produces over 300 million pounds of carbon black annually, utilized for tires, industrial rubber, and special products. The plant has approximately 200 employees and an annual payroll of approximately \$9.5 million (Cabot Corporation n.d.:3).

CHAPTER 5 PREVIOUS INVESTIGATIONS

The records at the Louisiana Division of Archaeology were examined for archeological investigations that have been conducted in the current project area as well as within St. Mary Parish overall. The site file search revealed that one site, the North Bend Bridge site (16SMY66) was located within the proposed construction easement. In addition, one site, 16SMY132, was located within 1 mi (1.6 km) of the current project area. Additional studies conducted in the coastal Louisiana area provide important archeological information and will be briefly discussed.

McIntire (1958) initiated professional archeology in the Louisiana coastal area during the 1950s with his *Prehistoric Indian Settlements of the Changing Mississippi River Delta*. Gagliano (1963, 1964, 1967) and his associates subsequently produced archeological and related research on the salt domes and coastal areas of south Louisiana. Jon Gibson (1990) reported on two decades of work in his *Archeological Survey of the Mid-Teche Ridge*, which included archeological investigations within the Atchafalaya Basin and the Vermilion and Teche systems.

More recent research conducted within the area include studies by Gagliano et al. (1975), Neuman (1977), and Goodwin et al. (1991). Investigations focusing on Bayou Teche include Gibson (1976), and Neuman's *Archival Study for Archeological Remains in the Lower Bayou Teche Watershed*. Research by Neuman and Servello (1976), Jon Gibson (1978; 1980), and Goodwin (1986) have dealt with site distribution and settlement patterns within the Atchafalaya Basin.

Though most research has been completed in other regions of the lower Atchafalaya Basin (Altschul 1978; Gagliano 1963, 1964, 1967; Gibson 1976, 1978, 1980, 1982, 1990; Goodwin 1986; Goodwin et al. 1991; Neuman 1977; Neuman and Servello 1976; Weinstein et al. 1978), the North Bend Bridge site (16SMY66) and the surrounding area have been included in intermittent archeological investigations since the 1950s. Previous investigations in the vicinity of the current project area are summarized below.

Gagliano et al. (1975)

Gagliano et al. (1975) conducted a cultural resource survey along 315.1 miles (507.1 km) of the Gulf Intracoastal Waterway (GIWW) and selected spurs. The study was concerned with the impact of maintenance dredging and spoil disposal on cultural resources (Gagliano et al. 1975). Survey of the GIWW located 158 sites from different prehistoric and historic occupations. During this survey, the North Bend site (16SMY132), located immediately north of the GIWW and the present project area, was recorded. At that time, the site was identified as two *Rangia* shell middens; the upper lens was considered spoil, however, the lower lens was defined as prehistoric. An *in situ* Tchefuncte-like sherd as well as other pottery sherds and small bone fragments were found among the shell (LA State Site Files).

Altschul (1978)

Jeffrey Atschul conducted a pipeline survey which transected Bayou Sale approximately 3 miles (4.8 km) northeast of the current project area. No prehistoric sites were located within the cultivated fields which were thoroughly examined, however, a nineteenth century historic scatter was noted. No sites were reported within the other segments of this survey.

Kuttruff et al. (1993)

Kuttruff et al. (1993) conducted testing at the North Bend site (16SMY132) as well as a cultural resource survey of the Todd Levee Survey Area, located approximately 1.3 km (.81 mi) west of Bayou Sale and approximately 3 km (9.8 mi) north of the North Bend site. The proposed construction surrounded the agricultural fields of the Todd Plantation. Within the Todd Levee Survey Area, shovel tests were excavated at 25 m (82.02 ft) intervals in an offset arrangement. No prehistoric cultural remains were located during the survey. Two light surface scatters of brick, *Rangia*, and oyster fragments were noted. These were interpreted as the result of road paving. The remains of a demolished structure were located in the southeast portion of the survey area, this was interpreted as dumped debris. One standing structure located within the survey area had been moved from elsewhere on the Todd plantation. The proposed levee construction in the Todd Levee Area was determined to have no detrimental effects on any historic or prehistoric cultural resources (Kuttruff et al. 1993).

The North Bend site (16SMY132) is situated on either side of Bayou Sale at the junction of that watercourse with the GIWW. These remains were associated with the North Bend Plantation complex, dating primarily to the late nineteenth and early twentieth century. Kuttruff et al. (1993:32) suggested that site 16SMY66, located on the south bank of the GIWW and the east bank of Bayou Sale, was also part of the North Bend Plantation complex.

A thorough pedestrian examination was completed at the site and its immediate surroundings prior to the initiation of the posthole and test excavations. The north bankline of the GIWW was carefully examined, cleaned, and mapped. A series of posthole tests were excavated along a 10 m (32.8 ft) grid over portions of the site extending north from the GIWW and within the proposed construction area. Three 1 x 2 m (3.28 x 6.56 ft) test units were excavated south of the sugar house remains. Two were placed adjacent to the GIWW bankline east of Bayou Sale, and the remaining unit was excavated adjacent to the GIWW bankline west of Bayou Sale.

Excavations conducted on the west side of Bayou Sale revealed that either heavy disturbance and/or redeposition of strata had occurred within this area. Along the east side of Bayou Sale, excavations revealed part of a brick foundation from a plantation tenant structure. Aerial photographs and maps suggest the existence of at least two other tenant structures within this location which were probably moved prior to or during the construction of the GIWW. Midden accumulation, and other deposits related to the occupation of the northern part of the tenant area were located *in situ* on the east side of Bayou Sale within the project area (Kuttruff et al. 1993). Structural remains of the North Bend sugar cane refinery are still present north of and outside of the project area.

Kuttruff et al. (1993:3, 61) redefine the North Bend site as the remains of North Bend Plantation and suggest that the originally reported prehistoric materials were probably the result of the use of aboriginal shell midden materials for paving in the area. Testing in the area of the original location of 16SMY132 yielded no prehistoric material (Kuttruff et al. 1993:91-95). Based on their efforts, Kuttruff et al. (1993) state that the intact foundations of one tenant house as well as the two documented tenant house foundations within the proposed construction area were eligible for nomination to the NRHP. They also indicate that the site's research potential is limited to a study of domestic tenant life (Kuttruff et al. 1993:101).

North Bend Bridge Site (16SMY66)

Philip G. Rivet identified the North Bend Bridge site (16SMY66) during his survey of the Intracoastal Canal bridge at North Bend for the Louisiana Department of Transportation and Development. The site was described as wave washed deposits of *Rangia* and oyster shell.

Mr. Rivet did not locate any *in situ* cultural deposits at this time. Glass fragments noted among the wave washed shell were problematical in their site association, especially given the nearby location of the North Bend Plantation Complex (16SMY132) (LA State Site Files).

Charles R. McGimsey visited 16SMY66 in 1995. McGimsey described the site location as relatively flat, which was not the case in 1977. McGimsey believed the "flattening" of the topography to be entirely the product of earth-moving activities. The original ground surface, a buried A horizon, was observed between 50 and 100 cm below ground surface. The fill above the buried A horizon contained abundant shell, which was winnowing out and forming small shell beaches as the bank of GIWW eroded. The cutbank was troweled and photographed. No evidence of a shell midden or other prehistoric cultural material were observed in the sediment below the fill. The buried A horizon contained historic materials, such as brick and metal fragments. McGimsey suggests that the site consists of historic, probably very recent redeposited material which is the product of either GIWW or highway bridge construction. Moreover, he believed that the cultural deposits were disturbed and had no research potential and that the site was not eligible for the NRHP (LA State Site Files).

CHAPTER 6 FIELD INVESTIGATIONS

Methodology

Investigations of the project area began with an inspection of the project right-of-way in order to locate 18 pipelines which intersect the survey area. Following this, the project right-of-way was surveyed. Survey consisted of two parallel transects spaced 10 m (33 ft) apart with shovel tests at 20 m (66 ft) intervals in an offset pattern. Shovel tests were not excavated in inundated areas or where there was 100 percent surface visibility. Shovel tests measured approximately 30 cm (12 in) in diameter and were excavated to sterile subsoil or a maximum depth of 50 cm (20 in). Excavated soil was screened through 1/4" (0.64 cm) wire mesh whenever possible. Where the nature of the soils rendered screening ineffective, they were carefully trowel-sorted and examined for cultural material.

A single line of auger tests placed at 20 m (66 ft) intervals were excavated between Sta. 14+51.70 and the western bankline of Bayou Sale. This area contained a greater spoil accumulation from the construction of the GIWW and required additional 1 to 2 m (3.28 to 6.6 ft) bucket auger tests. In addition, a visual inspection of the southern bankline of the Gulf Intra-coastal Waterway (GIWW) was performed along the entire length of the project right-of-way.

NRHP testing at site 16SMY66 began with establishing a grid over the site area. A temporary site datum was placed at N40 E20. The location of the cultural deposits observed in the bankline were tied into the grid and plotted on the site map. Due to the deeply buried cultural deposits observed in the bankline (80 cm bs), auger tests were placed at 10 m (33 ft) intervals along two intersecting lines and excavated to an average depth of 1.5 m bs (5 ft) in order to define the horizontal and vertical site extent within the project right-of-way.

Upon completion of the auger tests, three backhoe trenches were excavated. The stratigraphy in the first two trenches revealed disturbance associated with the Lambert Industries Asphalt Plant at this location in the mid-1970s. Auger tests and subsequent trenching indicated that the midden had been destroyed south of the N20 line.

Four 1 m² excavation units were placed along the northern ends of Trenches 1 and 2. The locations of the units were chosen based upon the cultural material collected from Trenches 1 and 2 and the associated stratigraphy. Soils were excavated in 10 cm (4 in) levels within natural strata. Excavated soil was dry screened through 1/4" (0.64 cm) mesh, and 10 liter (2.64 gal) soil samples were collected for laboratory flotation. At the completion of each unit, two walls were profiled and photographed.

Results of Survey

Bankline Survey. An inspection of the bankline along the project right-of-way (including the 16SMY66 area) was conducted in order to check for the presence of eroding cultural deposits. Inspection along the water line was conducted in areas where safety permitted; other areas were observed from above. Proceeding east from Sta. 0+00 to the western edge of Bayou Sale, no cultural deposits were encountered in the profile of the bankline. The stratigraphy revealed in this area consisted of an upper humus layer of 10YR 2/1-2/2 (very dark brown to black) carbon black/silt loam matrix. This lens varied in thickness between 10 to 50 cm (4 to 20 in). Underlying this stratum was a 10YR 4/1-4/2 (dark gray to dark grayish brown) silty clay transitioning to clay matrix continuous to the waterline.

Within the boundaries of site 16SMY66, the bankline was photo-documented and tied to the site grid (Plate 1). This profile revealed stratigraphy similar to that encountered in the site delineation auger test N39.8 E20 (Figure 6). From the access road east of Highway 317 to Sta. 36+43.80, heavy disturbance from seven gas pipeline crossings was observed. The bankline stratigraphy along this area consisted of riprap used to stabilize the shoreline. Beyond the defined boundaries of site 16SMY66 to the end of the project right-of-way, no cultural deposits were encountered.

Survey of the Levee Right-of-Way. Transects 1 and 2 originated at Sta. 0+00 and proceeded eastward. A total of 61 shovel tests were excavated. None of these yielded cultural materials. Shovel tests 1 through 23 along both transects revealed similar stratigraphy and contained no intact or *in situ* cultural materials. Two stratigraphic horizons were encountered in these shovel tests (Figure 7). The upper horizon consisted of a 10YR 2/1-2/2 (very dark brown to black) silty loam matrix varying in thickness between 10 to 50 cm bs (4 to 20 in). This matrix was permeated with carbon black residue from the Cabot Plant on the north side of the GIWW. The underlying stratum was a 10YR 4/1-4/2 (dark gray to dark grayish brown) silty clay transitioning to clay matrix, encountered to the base of the shovel tests.

Shovel test locations 24 through 29 along Transect 1 were in a sugarcane field along the west side of Bayou Sale. Along Transect 2, these tests were located in the access road on the west side of Bayou Sale. Surface inspections of these areas revealed only modern debris. Shovel test locations 30 through 33 along Transects 1 and 2 crossed the inundated abandoned Bayou Sale distributary channel from the 3+85 Spur to the 6+36.97 Spur.

Shovel test locations 34 through 38 along Transect 1 were in the access road on the east side of Bayou Sale. Surface inspection of this area revealed modern debris. Along Transect 2, shovel test locations 34 through 38 were underwater on the eastern side of Bayou Sale.

Heavy disturbance was encountered along both transects proceeding east from Bayou Sale. These disturbances are the result of activities associated with the abandoned Lambert Industries Asphalt Plant, underground pipelines, and Highway 317. Shovel tests 39 through 51, excavated in this area, contained an upper stratum of carbon black-stained silt matrix overlying clay. Shovel test locations 52 through 60 along both transects were in an inundated area along the south side of the gravel access road leading to the Mobil Oil Loading Dock and Sta. 36+43.8 at the end of the project right-of-way (Figure 2).

Six auger tests were excavated between Sta. 14+51.70 and the western bankline of Bayou Sale. There was no indication of intact cultural deposits, however, shell was recovered in some of the auger tests. Each test was numbered sequentially from Auger Test 1 to Auger Test 6, initiating on the western edge of Bayou Sale and proceeding west (Figure 8). The results of the auger tests are summarized in Table 2.

The auger tests excavated in this area revealed five strata (Figure 8). The uppermost is Stratum 1, a 10YR 5/4 (yellowish brown) medium/coarse sand matrix with oyster, *Rangia*, and gravel. This is interpreted as a fill episode which was hauled in from an unknown, off-site source. Below this is Stratum 2, a 5Y 3/1 (very dark gray) organic clay mottled with 5Y 2.5/1 (black) and 5GY 4/1 (dark greenish gray) and with inclusions of small brick fragments, iron fragments, wood, roots, and very few ceramics. This is also interpreted as a fill episode. The probable source for this fill is the Bayou Sale Slip east of this area. Underlying this is Stratum 3, a 10YR 6/6 (brownish yellow) fine sand or 5Y 5/1 (gray) fine sand when gleyed. This fill episode's probable source is the initial work on the GIWW. Stratum 5 is a 10YR 4/1 (dark gray) plastic, stiff clay mottled with 10YR 6/6 (brownish yellow). This stratum is the C horizon from the natural levee association. The final stratum is a 10YR 7/4 (very pale brown) silt loam matrix mottled with 10YR 8/8 (yellow) which degrades into clay and then sand. This



Plate 1. View of the 16SMY66 bankline.

Table 2. Results of Auger Tests Located West of Bayou Sale.

Auger Test No.	Depth cm bs	Soil Description	Inclusions
1	0-50	10YR 5/4 (yellowish brown) medium coarse sand fill	heavy <i>Rangia</i> permeated with carbon black
	50-78	5Y 3/1 (very dark gray) organic clay mottled with 5Y 2.5/1 (black) and 5GY 4/1 (dark greenish gray)	<i>Rangia</i> and carbon black, very small brick flecks
	78-90	10YR 6/6 (brownish yellow) fine sand or 5Y 5/1 (gray) fine sand when gleyed fill	
	90-100	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
	100-155	10YR 7/4 (very pale brown) silt loam mottled with 10YR 8/8 (yellow)	
2	0-57	10YR 5/4 (yellowish brown) medium coarse sand fill	<i>Rangia</i> and carbon black, dense shell impenetrable below 57 cm bs
3	0-58	10YR 5/4 (yellowish brown) medium coarse sand fill	<i>Rangia</i> , oyster, and gravel
	58-70	5Y 3/1 (very dark gray) organic clay mottled with 5Y 2.5/1 (black) and 5GY 4/1 (dark greenish gray)	whole and crushed <i>Rangia</i>
	70-80	10YR 6/6 (brownish yellow) fine sand or 5Y 5/1 (gray) fine sand when gleyed fill	minimal <i>Rangia</i>
	80-128	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
	128-140	10YR 7/4 (very pale brown) silt loam mottled with 10YR 8/8 (yellow)	
4	0-30	10YR 5/4 (yellowish brown) medium coarse sand fill	carbon black
	30-50	10YR 6/6 (brownish yellow) fine sand or 5Y 5/1 (gray) fine sand when gleyed fill	
	50-99	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
	99-202	10YR 7/4 (very pale brown) silt loam mottled with 10YR 8/8 (yellow)	
5	0-14	10YR 5/4 (yellowish brown) medium coarse sand fill	carbon black
	14-140	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
6	0-20	10YR 5/4 (yellowish brown) medium coarse sand fill	dense shell and carbon black
	20-110	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
	110-150	10YR 7/4 (very pale brown) silt loam mottled with 10YR 8/8 (yellow)	

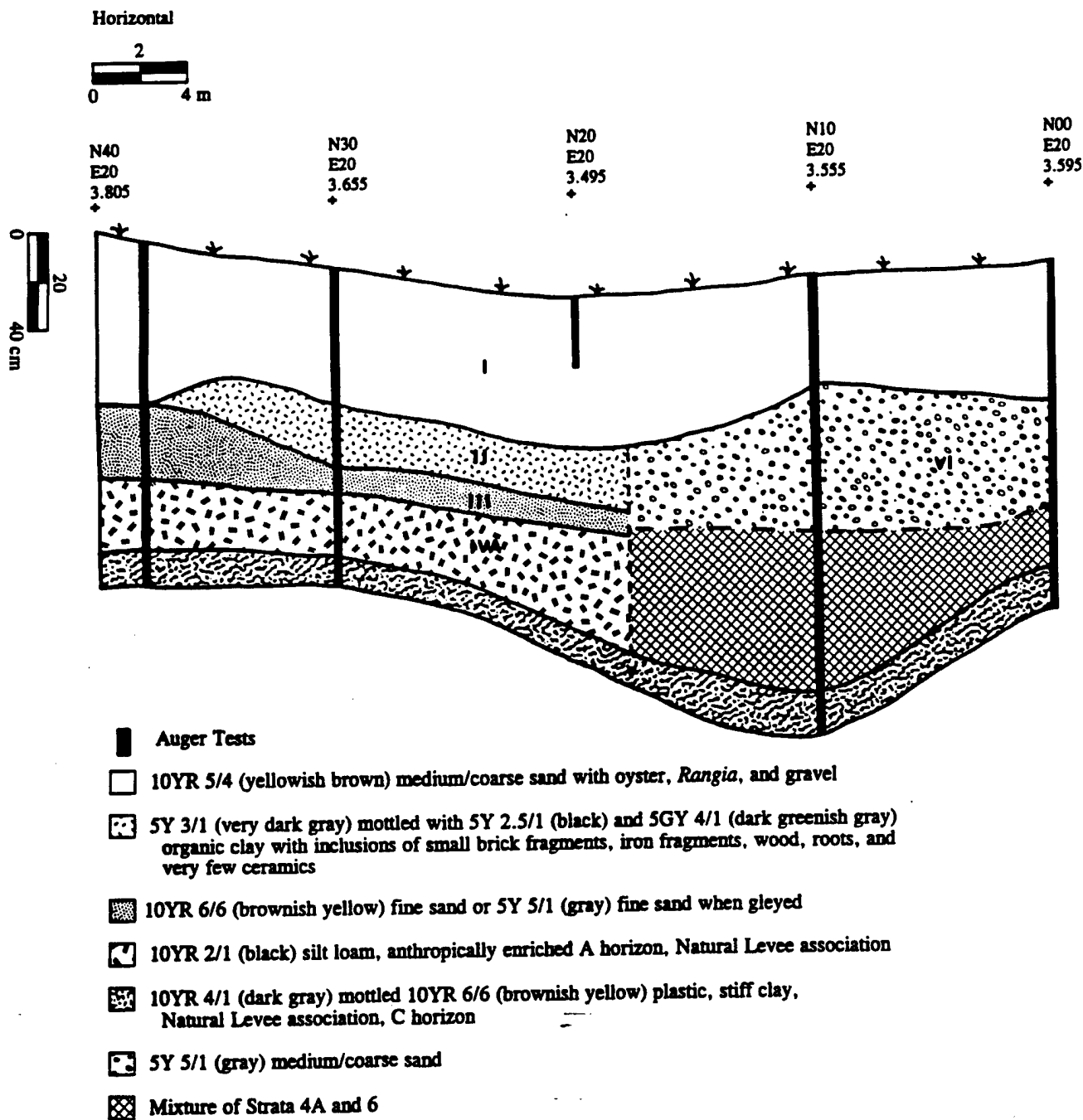
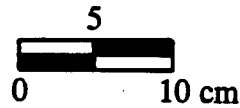
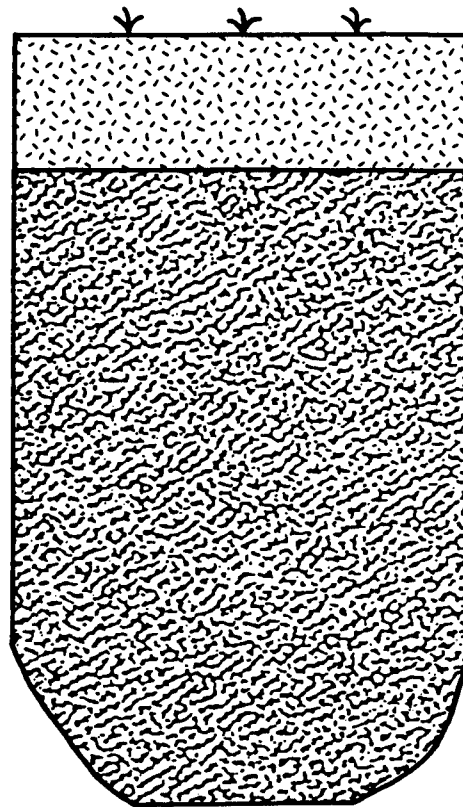


Figure 6. Site 16SMY66 E20 line auger test profiles.





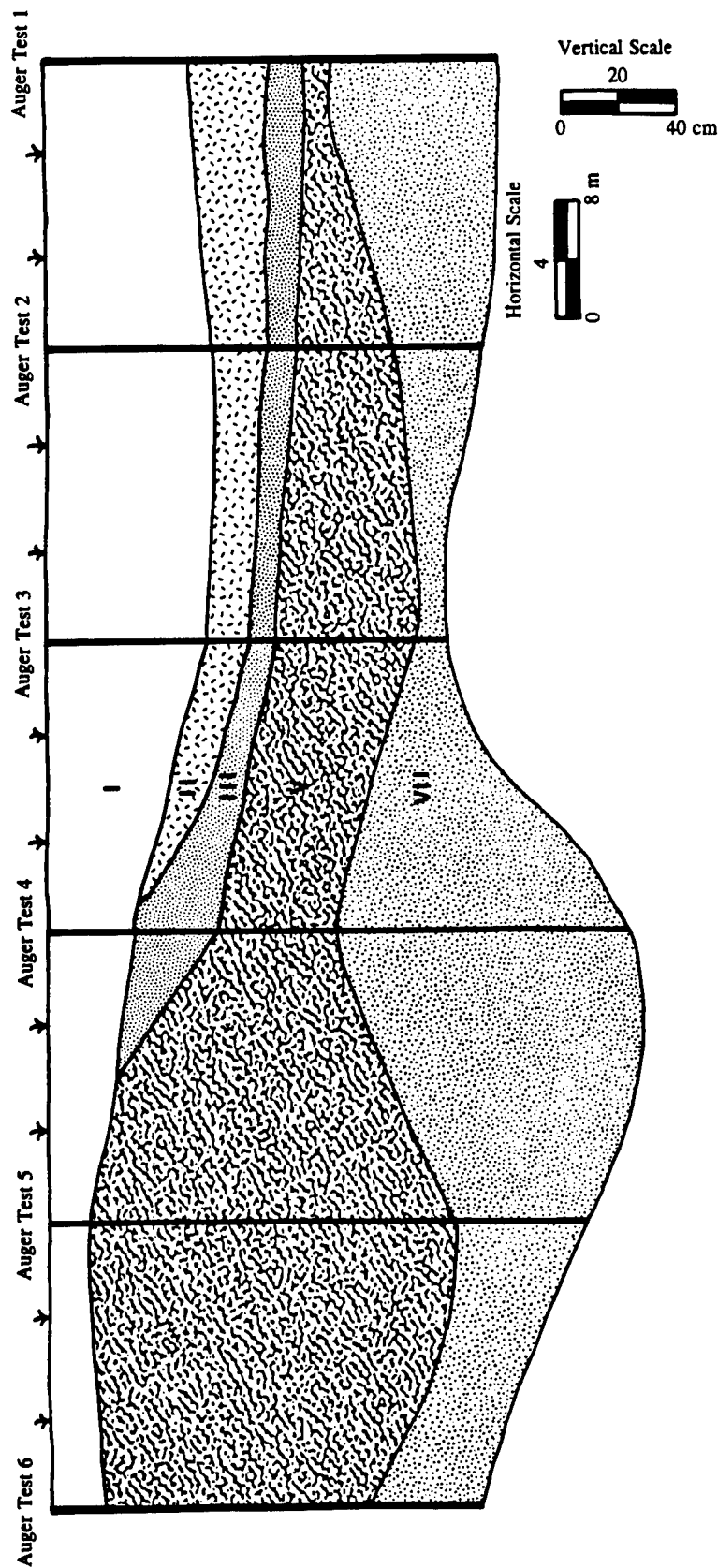
-  10 YR 2/2 (very dark brown) humus / carbon black silty loam
-  10 YR 4/2 (dark grayish brown) clay

Figure 7. Representative profile of shovel test in project right-of-way.

STA 18+02.53

STA 14+51.70



- ☐ 10 YR 5/4 (yellowish brown) medium/coarse sand matrix with oyster, Rangia, and gravel. Fill episode 1. Hauled in from unknown off-site source.
- ☒ 5 Y 3/1 (very dark gray) mottled with 5 Y 2.5/1 (black) and 5 GY 4/1 (dark greenish gray) organic clay with inclusions of small brick fragments, iron fragments, wood, roots, and very few ceramics. Fill episode 2. Probable source is the Bayou Sale Slip west of site area.
- ☒ 10 YR 6/6 (brownish yellow) fine sand or 5 Y 5/1 (gray) fine sand when gleyed. Fill episode 4. Probable source is the initial work on the Intracoastal canal.
- ☒ 10 YR 4/1 (dark gray) mottled 10 YR 6/6 (brownish yellow) plastic, stiff clay. C horizon from Natural Levee association.
- ☒ 10 YR 7/4 (very pale brown) mottled 10 YR 8/8 (yellow) silt loam matrix. Clay replaced rapidly with sand as profile deepens. From Point Bar association.

Figure 8. North profile of auger tests 1-6 on west bank of Bayou Sale.

point bar deposit was designated Stratum 7. No *in situ* cultural material nor intact features were encountered in this area.

NRHP Testing at 16SMY66

The Bayou Sale site lies at the crest of the natural levee ridge of the Bayou Sale deltaic distributary, immediately adjacent to the relict distributary channel now occupied by the underfit stream named Bayou Sale. The elevation of the site area is approximately 5 ft (1.5 m) above sea level (NGVD). Throughout most of its length, the abandoned distributary channel is filled with sediment to approximately sea level and is characterized by swamp forest and aquatic vegetation except for the very narrow channel of Bayou Sale. However, immediately adjacent to the site, the abandoned channel was dredged at some unknown time to allow water access to some type of industrial development on the site. The dredged slip extends for a distance of about 100 m (328 ft) and connects with the GIWW to the north. The width of the slip is essentially the same as the abandoned channel.

Initially, a grid was established across the site and tied into the U.S. Army Corps of Engineers Benchmark 7. All cultural and natural features and excavations were plotted on the site map (Figure 9). Ten auger tests were excavated during site delineation. The results of these are summarized in Table 3.

A profile of the E20 line revealed six strata (Figure 6), while the profile from the N20 line revealed five strata (Table 3). Site stratigraphy as interpreted by Dr. Roger Saucier is presented below. South of the N20 line (Figure 6), Stratum 2, 3, and 4A appear to truncate. This is probably the result of construction associated with the former asphalt plant.

Backhoe Trenches

Three backhoe trenches were excavated after auger testing was completed. These trenches were located at: N35 E25 to N10 E25 (Trench 1), N35 E15 to N10 E15 (Trench 2), and N25 E10 to N25 E30 (Trench 3). Backhoe trenching began with the excavation of Trenches 1 and 2 to show the north/south stratigraphy of the site. As stated previously, the stratigraphy in these trenches revealed the extent of disturbance from the asphalt plant.

Interpretations of borings at the LA Hwy 317 bridge (Louisiana Geological Survey, 1992) and observations made by Dr. Roger Saucier during the excavation of the trenches at 16SMY66 indicate the shallow subsurface stratigraphy consists of several feet of natural levee deposits overlying point bar deposits. The former represent vertical accretion during episodes of overbank flooding whereas the latter represent horizontal accretion on a river channel bar behind a meandering channel. However, as portrayed by the mapping of May et al. (1984) and Smith et al. (1986), the immediate site vicinity should consist of natural levee deposits overlying abandoned distributary channel fill. This situation is illustrated in Louisiana Geological Survey (1992:Figure 9).

It appears that the extent (width) of the abandoned channel fill shown in maps of the area is based not on surface morphology or other discernible characteristics, but rather on the probable maximum size of the channel when it was carrying full discharge. The backhoe trenches, however, did not verify natural levee overlying abandoned channel fill as being present at the site. Instead, the sedimentary sequence is definitely one of natural levee overlying point bar deposits. This leads to two possible interpretations. First, the former maximum-sized channel was either smaller in size and/or located west of the site area than has been mapped. Second, the process of distributary abandonment was rather slow, and deposits were

Table 3. Results of 16SMY66 Site Delineation Auger Tests

Auger Test	Depth cm bs	Soil Description	Inclusions
N39.8 E20	0-67	10YR 5/4 (yellowish brown) medium coarse sand fill	gravel and crushed shell
	67-90	10YR 6/6 (brownish yellow) fine sand or 5Y 5/1 (gray) fine sand when gleyed fill	
	90-120	10YR 2/1 (black) silt loam	very small brick, charcoal, unidentified metal frags., shell/calcined bone, bone, and possible shoeing nail; Anthropically enriched A horizon; natural levee association.
	120-140	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
N30 E20	0-57	10YR 5/4 (yellowish brown) medium coarse sand fill	crushed Rangia and shell increasing with depth
	57-81	5Y 3/1 (very dark gray) organic clay mottled with 5Y 2.5/1 (black) and 5GY 4/1 (dark greenish gray)	ironstone fragment
	81-94	10YR 6/6 (brownish yellow) fine sand or 5Y 5/1 (gray) fine sand when gleyed fill	
	94-119	10YR 2/1 (black) silt loam	charcoal, wood, bone, brick frags., coal, a hogs tooth, unidentified metal frags., nail frags.; Anthropically enriched A horizon; natural levee assoc.
	119-131	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
N10 E20	0-45	10YR 5/4 (yellowish brown) medium coarse sand fill	dense gravel and dense crushed shell
	45-105	5Y 5/1 (gray) medium/coarse sand	dense crushed shell
	105-170	5Y 5/1 (gray) medium/coarse sand mixed with 10YR 2/1 (black) silt loam 10YR 2/1 (black) silt loam	midden deposit with large brick fragment, bone, and metal frags.
	170-185	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
N0 E20.5	0-60	10YR 5/4 (yellowish brown) medium coarse sand fill	dense gravel and water
	60-130	5Y 5/1 (gray) medium/coarse sand	dense crushed shell, and brick frags.
	130-143	5Y 5/1 (gray) medium/coarse sand mixed with 10YR 2/1 (black) silt loam 10YR 2/1 (black) silt loam	
N20 E0	0-33	10YR 5/4 (yellowish brown) medium coarse sand fill	shell, and carbon black
	33-97	5Y 3/1 (very dark gray) organic clay mottled with 5Y 2.5/1 (black) and 5GY 4/1 (dark greenish gray)	large brick frags.
	97-170	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
N20 E10	0-50	10YR 5/4 (yellowish brown) medium coarse sand fill	shell and carbon black
	50-80	5Y 3/1 (very dark gray) organic clay mottled with 5Y 2.5/1 (black) and 5GY 4/1 (dark greenish gray)	
	80-124	10YR 4/1 (dark gray) silt loam	
	124-143	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	
N20 E20	0-23	Compacted crushed shell and gravel; impenetrable below 23 cm	
N20 E30	0-19	Compacted crushed shell and gravel; impenetrable below 19 cm	
N20 E40	0	test unexcavated; located adjacent to concrete pad	
N10 E25	0-57	10YR 5/4 (yellowish brown) medium coarse sand fill	dense shell and pebbles and carbon black, small brick fragments
	57-122	10YR 4/1 (dark gray) plastic stiff clay mottled with 10YR 6/6 (brownish yellow)	

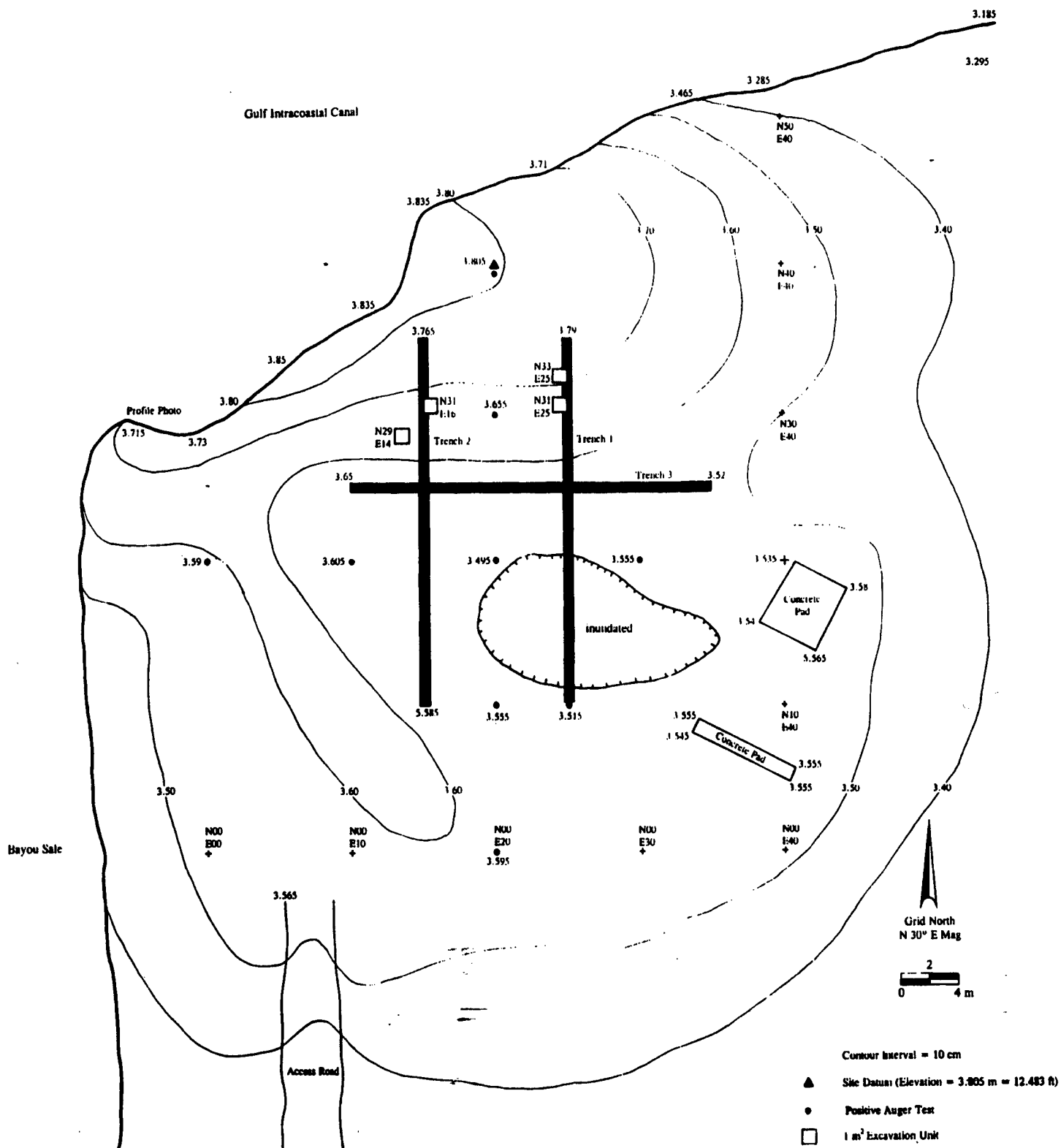


Figure 9. Site 16SMY66 planview and contour map.

laid down in a point bar environment as flow diminished (coarse-grained channel fill) as opposed to swift abandonment and fine-grained deposition in a slack water environment. Evidence strongly favors the latter. Under this scenario, the natural levee continued to develop and grow inward toward a progressively narrowing channel and overlying point bar deposits.

However rapidly the distributary channel was abandoned and filled, regional geologic evidence indicates that it was completely inactive by at least 3,500 years ago. Consequently, the landscape of the site area was essentially in its present form well before historic times and there have been no significant morphologic changes (other than anthropogenic) during the past several centuries.

Site Stratigraphy. The backhoe trenches at the site revealed the presence of eight distinct strata, some of which are natural and some of which were the direct result of human activity. The characteristics and geomorphic implications of each are discussed below, beginning with the deepest and oldest strata. Reference is made to the trench profiles contained in Figures 10 through 12.

Stratum 7. Encountered only in Trench 3 at a depth of about 200 cm (6.56 ft) below ground surface, this unit consists of mottled very pale brown (10YR 7/4) and yellow (10YR 8/8) silt loam that coarsens downward into silty fine sand. The deposit is massive without apparent stratification or bedding. The deposit was present to the maximum depth of the trench at 380 cm (12.46 ft).

This stratum represents the upper portion of a typical point bar sequence where it grades upward into natural levee deposits. Borings made at the LA Hwy 317 bridge across the GIWW indicate the point bar sands continue to a depth of 24 m (78.7 ft). This approximates the maximum depth of the laterally-shifting Bayou Sale distributary channel which cut out preexisting deltaic deposits and replaced them with point bar deposits.

Point bar deposits unquestionably underlie the entire site area at about the same depth. Based on the high water table and permeable nature of the deposits, they are obviously hydraulically connected with the adjacent GIWW.

Stratum 6. This unit was encountered only at the southern end of Trenches 1 and 2 and at a depth of 100 to 125 cm (3.28 to 4.1 ft). It consists of at least 50 cm (1.64 ft) of gray (5Y 5/1) medium to coarse sand.

Based on the fact that the Stratum 6 lies stratigraphically adjacent to undisturbed natural levee deposits (Stratum 5), but is abruptly and sharply separated from them by a high-angle unconformity, it is interpreted that the stratum is artificially intrusive into the natural levee deposits. It is surmised that a shallow excavation was made and then backfilled with material derived from an offsite source since sand of this grain size does not occur naturally at the surface.

The age of the intrusion is unknown, however, the site stratigraphy indicates it took place after the initial habitation, possibly in the early 19th century, on the natural levee (as evidenced by the truncated Stratum 4A).

Stratum 5. Stratum 5 occurs at a nominal depth of about 100 cm (3.28 ft) and has a thickness of about 90 cm (2.95 ft) where encountered in Trench 3. It consists of mottled dark gray (10YR 4/1) and brownish yellow (10YR 6/6) stiff, plastic, moderately oxidized, slightly silty clay.

This unit is interpreted as undisturbed natural levee deposits that grade downward into underlying point bar deposits through a diffuse, 10-cm-thick (0.33 ft) transition zone. The natural levee deposits represent the C horizon or parent material of the soil profile formed within the deposits.

Although age estimates vary among geoscientists, most would agree that the natural levee deposits of the Bayou Sale distributary are at least 3,900 years old. In the immediate site vicinity, they probably represent the final stage of levee formation that took place during the phase of declining discharge and distributary abandonment.

Stratum 4B. Overlying and gradational with Stratum 5 is a mostly continuous, 10- to 20-cm-thick (0.33- to 0.66-ft-thick) unit that is a friable, slightly mottled silt loam that is darker in color than Stratum 5 due to an apparent increase in organic matter. This material is interpreted as the natural A horizon of the soil profile developed in the natural levee deposits.

The A horizon represents the pedogenesis that affected the natural levee deposits between about 3,900 years ago and the early to mid 19th century. It was a time of no apparent human activity and no significant sedimentation under a deciduous hardwood forest vegetative community.

Stratum 4A. Stratum 4A, 5 to 20 cm (0.16 to 0.66 ft) thick, is irregular and discontinuous across the site area. It consists of dark gray brown (10YR 4/2) to black (10YR 2/1) silt loam matrix. This stratum consists of the upper part of the natural levee deposits (Stratum 4B) that have been severely impacted or altered by human activity. Incorporated in the silt loam matrix are brick fragments, charcoal, broken ceramics, and other domestic waste. Strata 4A and 4B are conformable, and some cultural materials are intruded into Stratum 4B. Based on artifacts recovered from the trenches and hand-excavated units, this zone dates after the turn of the twentieth century.

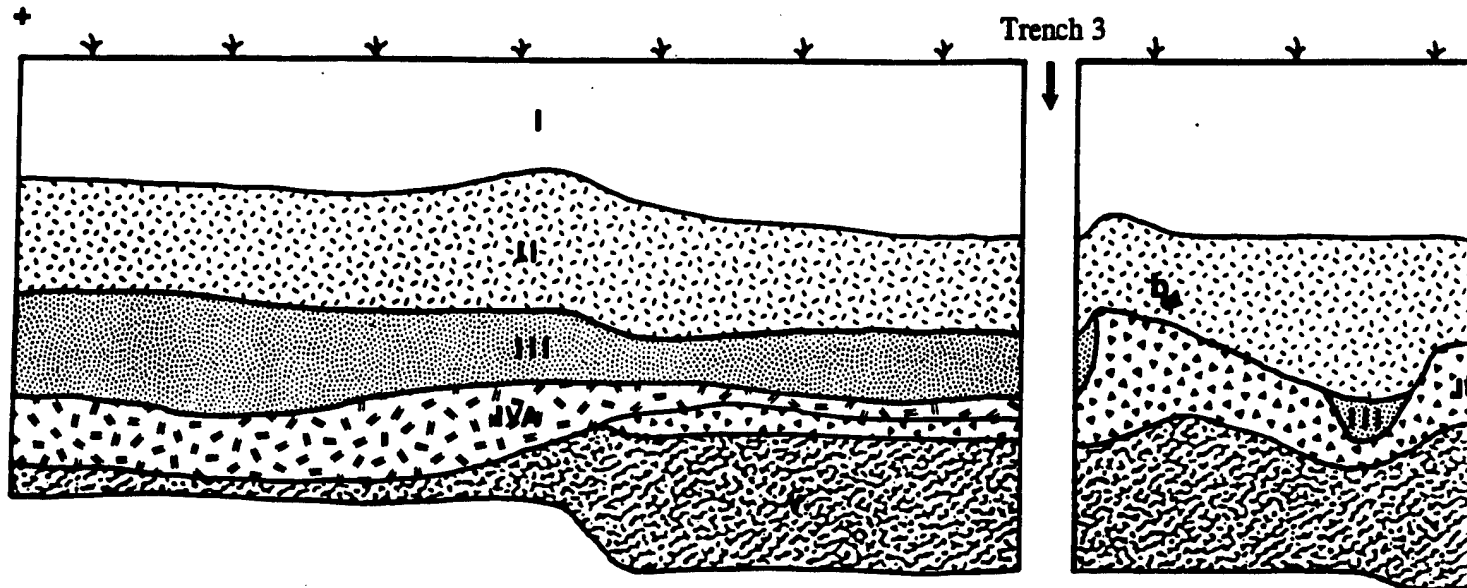
Stratum 3. This unit varies in thickness from 0 to 30 cm (0.98 ft), discontinuously overlies Stratum 4A, and occurs at a depth of about 70 cm (2.3 ft). It consists of brownish yellow (10YR 6/6) to gray (5Y 5/1) fine sand that lacks artifacts and signs of human activity.

There are no reasons to believe that the deposits of Stratum 3 were hauled into the area, yet sand of this type does not naturally occur at or close to the ground surface. It is hypothesized that the deposits are point bar materials that were excavated during dredging of the GIWW and placed on its banks as spoil. It is not known exactly how deep the GIWW is, but typically it was dredged to about 3.7 m (12 ft)--well into the zone of point bar sands.

Stratum 2. By far the most heterogeneous in composition of all of the strata, this unit consists of stiff, mottled, very dark gray (5Y 3/1), black (5Y 2/5/1), and dark greenish gray (5GY 4/1) clay and organic clay with thin lenses and pockets of silt and silty sand. Scattered throughout the matrix are brick fragments, nails, pieces of iron, *Rangia* shells, wood, and occasional pieces of ceramics. The stratum is continuous across the site and varies in thickness from about 30 to 80 cm (0.98 to 2.6 ft). Depending on location at the site, it unconformably overlies Strata 3, 4A, 4B, or 6.

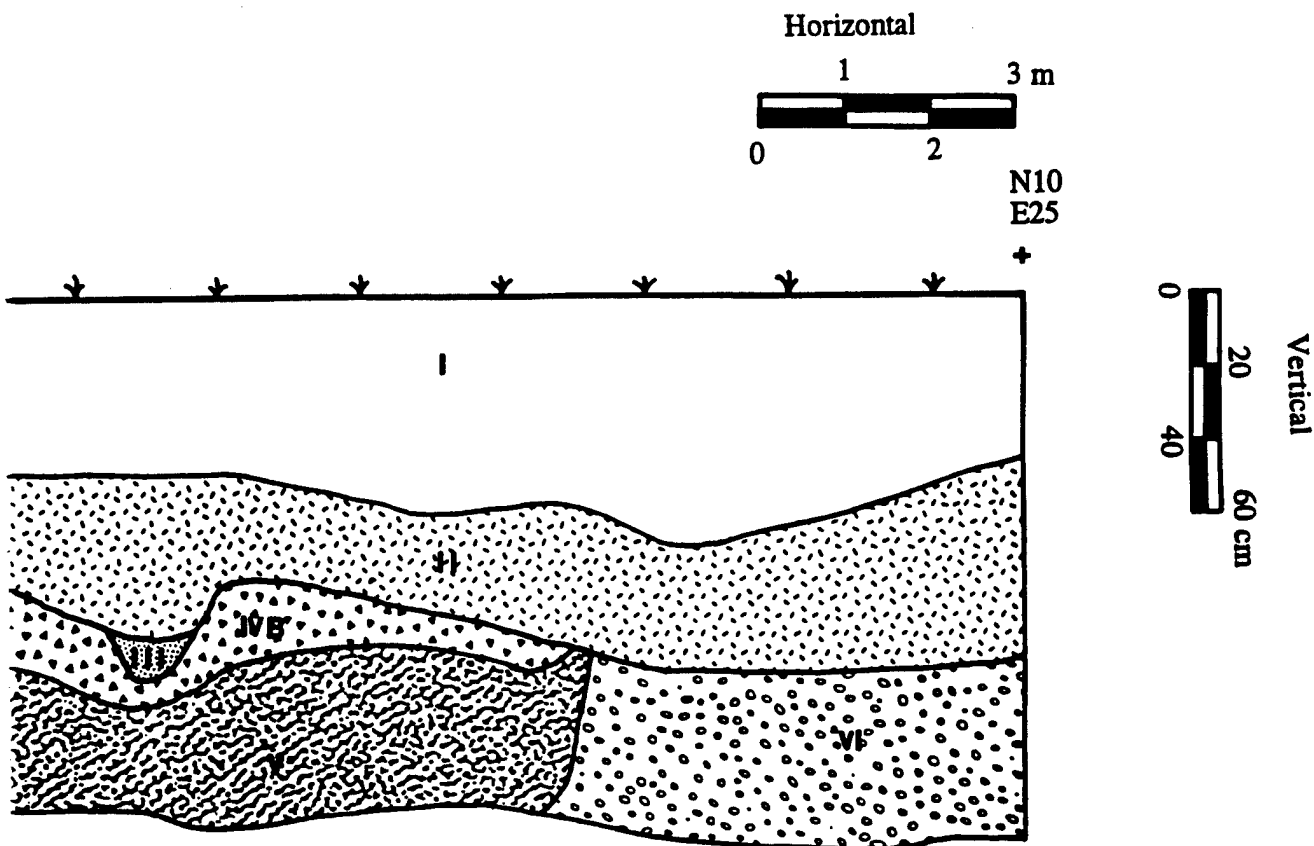
It appears certain that the deposits of this stratum were excavated from the slip immediately to the west of the site. They consist of typical organic-rich abandoned channel fill mixed with refuse that was intentionally or unintentionally thrown into the abandoned channel. The vintage of the cultural debris appears to range from the early/mid 19th century to the mid 20th century. It is not surprising that the topographically low abandoned channel served for a long time as a convenient dump area.

N35
E25



- 10YR 5/4 (yellowish brown) medium/coarse sand with oyster, *Rangia*, and
- ▨ 5Y 3/1 (very dark gray) mottled with 5Y 2.5/1 (black) and 5GY 4/1 (dark gray) organic clay with inclusions of small brick fragments, iron fragments, and very few ceramics
- ▩ 10YR 6/6 (brownish yellow) fine sand or 5Y 5/1 (gray) fine sand when g
- ▧ 10YR 2/1 (black) silt loam, anthropically enriched A horizon, Natural Le
- ▦ 10YR 4/1 (dark gray) silt loam, Natural Levee association, A horizon
- ▤ 10YR 4/1 (dark gray) mottled 10YR 6/6 (brownish yellow) plastic, stiff Natural Levee association, C horizon
- ▥ 5Y 5/1 (gray) medium/coarse sand
- b brick

Figure 10. East wall profile of Trench 3



h oyster, *Rangia*, and gravel

5GY 4/1 (dark greenish gray)
s, iron fragments, wood, roots, and

/) fine sand when gleyed

horizon, Natural Levee association

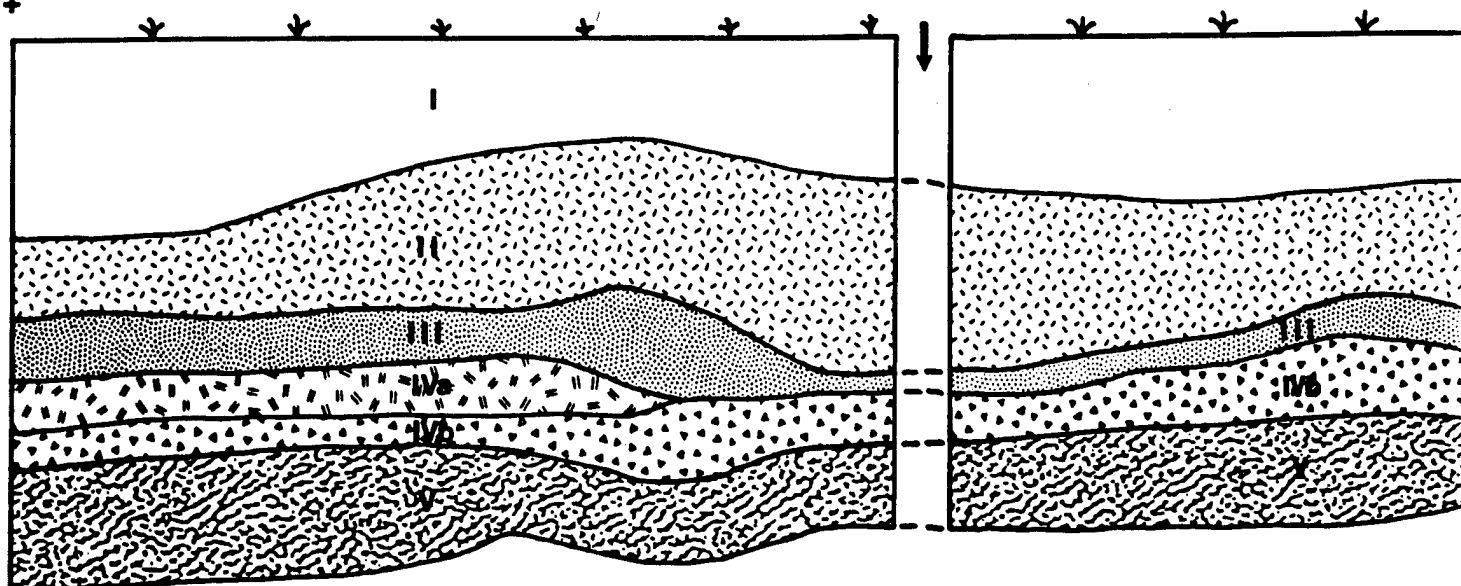
ation, A horizon

ellow) plastic, stiff clay,

wall profile of Trench 1.

N35
E15
+

Trench 3



10 YR 5/4 (yellowish brown) medium/coarse sand matrix with oyster, Rangia, and gravel.



5 Y 3/1 (very dark gray) mottled with 5 Y 2.5/1 (black) and 5 GY 4/1 (dark greenish gray) fragments, wood, roots, and very few ceramics. Fill episode 2. Probable source is the Bay.



10 YR 6/6 (brownish yellow) fine sand or 5 Y 5/1 (gray) fine sand when gleyed. Fill episode 3. Probable source is the Bay.



10 YR 2/1 (black) silt loam matrix. Anthropologically enriched A horizon. Natural Levee as.



10 YR 4/1 (dark gray) silt loam matrix. A horizon from Natural Levee association.



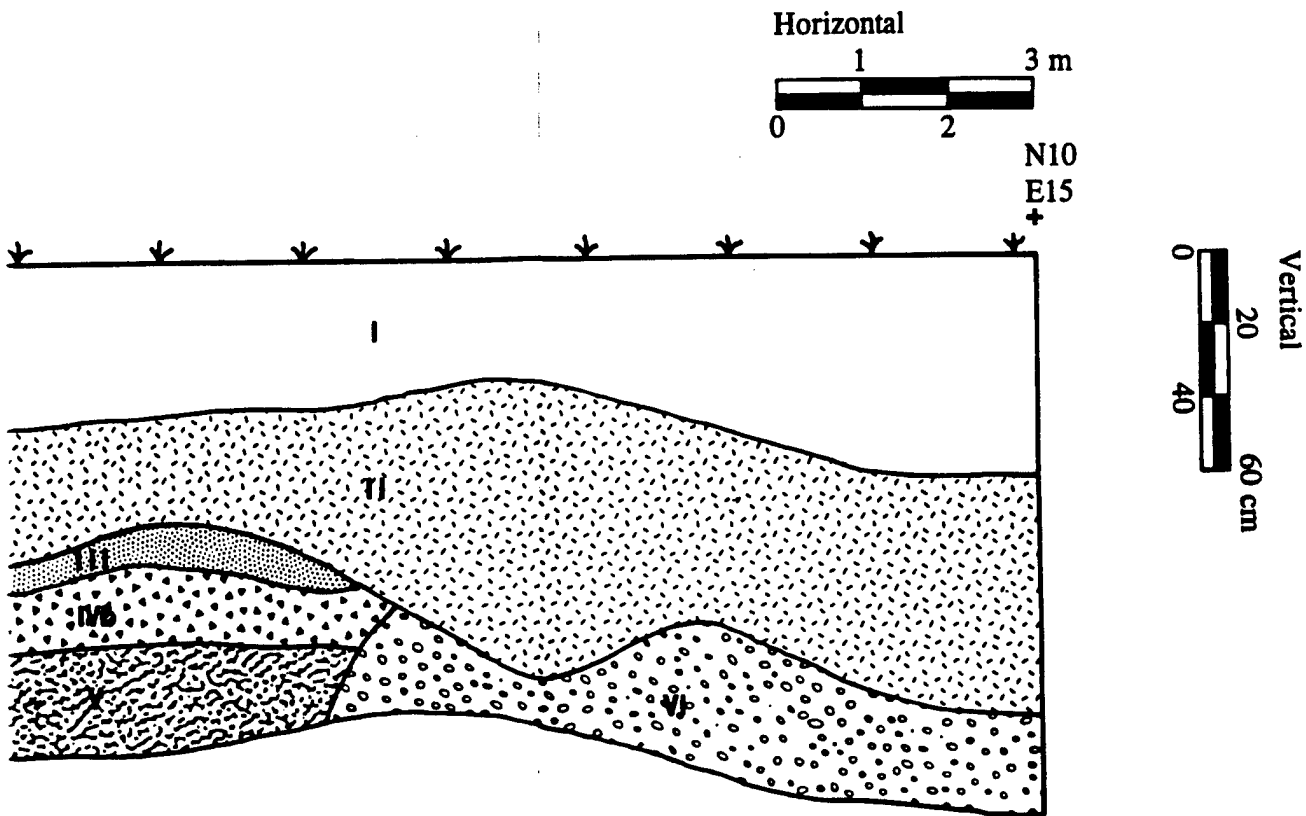
10 YR 4/1 (dark gray) mottled 10 YR 6/6 (brownish yellow) plastic, stiff clay. C horizon from Natural Levee association.



5 Y 5/1 (gray) medium/coarse sand. Fill episode 3. Probable source is hauled from unknown.

Figure 11. East profile of Trench 2.

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ter, Rangia, and gravel. Fill episode 1. Hauled in from unknown off-site source.

4/1 (dark greenish gray) organic clay with inclusions of small brick fragments, iron
 probable source is the Bayou Sale slip west of site area.

when gleyed. Fill episode 4. Probable source is the initial work in Intracoastal canal.

horizon. Natural Levee association.

levee association.

stiff clay. C horizon from Natural Levee association.

is hauled from unknown off-site source.

profile of Trench 2.

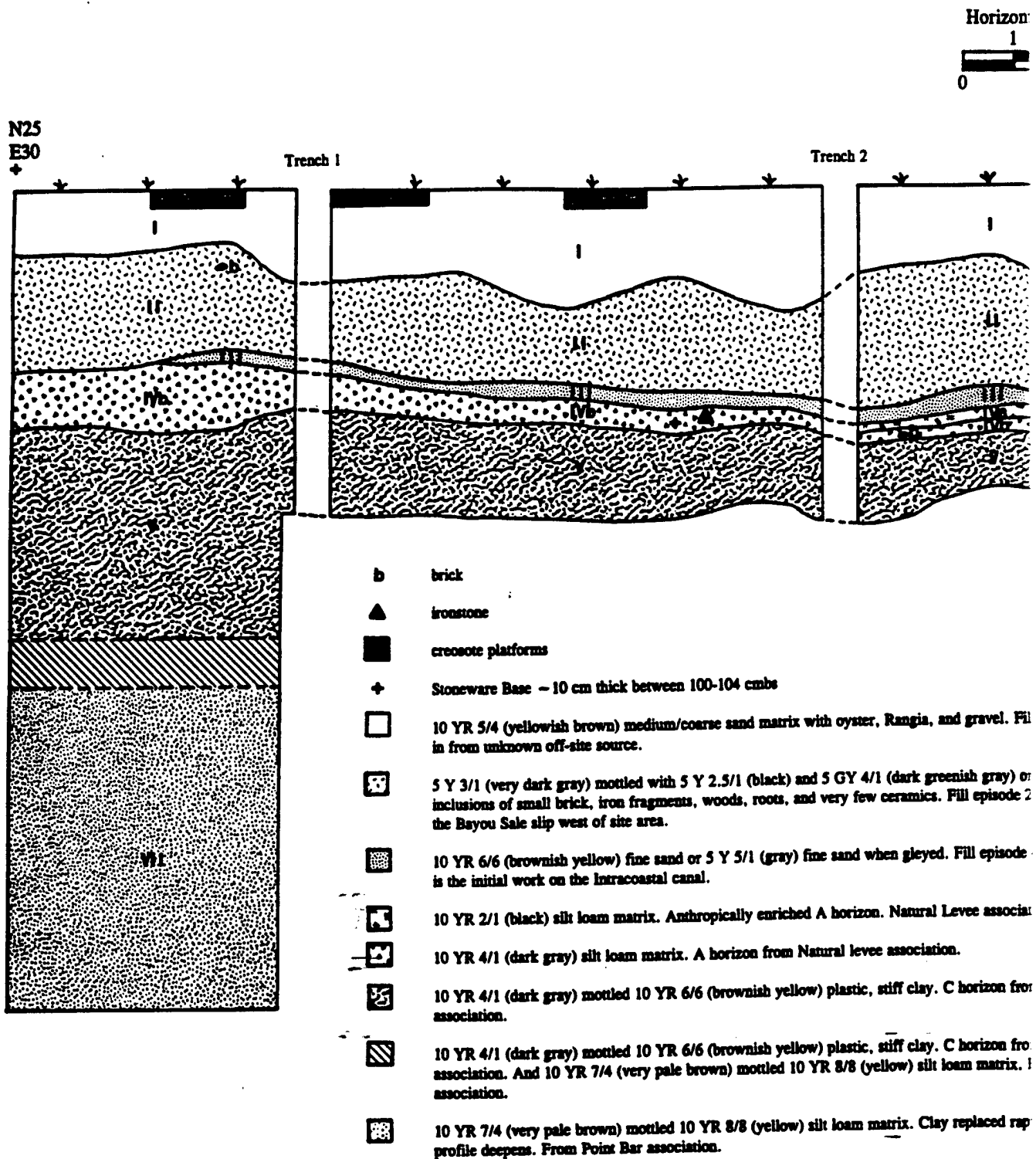
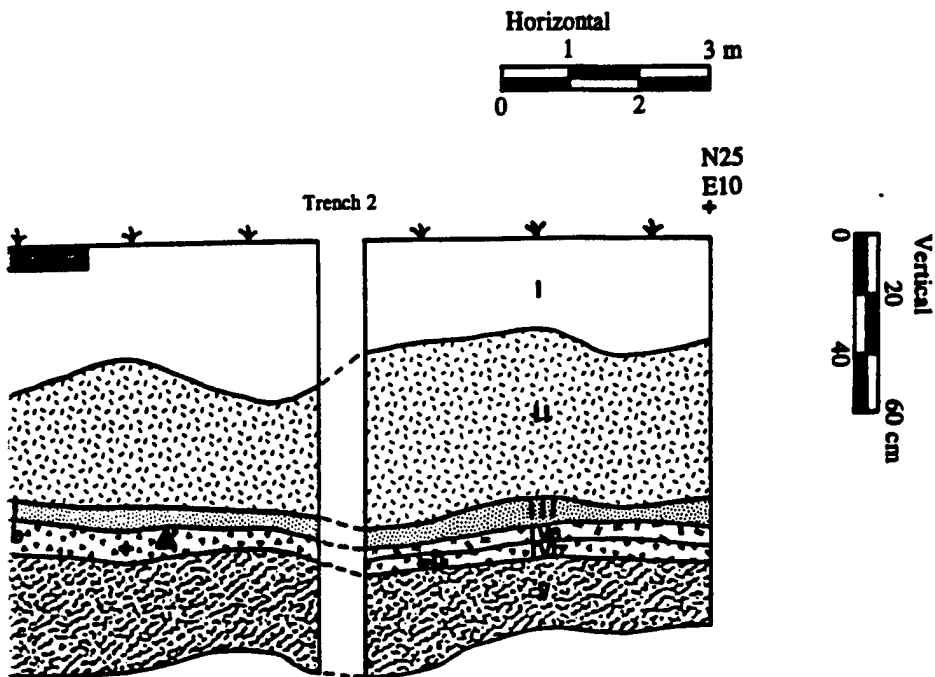


Figure 12. South wall profile of Trench 3.

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thick between 100-104 cmbs

rown) medium/coarse sand matrix with oyster, Rangia, and gravel. Fill episode 1. Hauled
= source.

) mottled with 5 Y 2.5/1 (black) and 5 GY 4/1 (dark greenish gray) organic clay with
iron fragments, woods, roots, and very few ceramics. Fill episode 2. Probable source is
of site area.

low) fine sand or 5 Y 5/1 (gray) fine sand when gleyed. Fill episode 4. Probable source
= Intracoastal canal.

am matrix. Anthropically enriched A horizon. Natural Levee association.

silt loam matrix. A horizon from Natural levee association.

mottled 10 YR 6/6 (brownish yellow) plastic, stiff clay. C horizon from Natural Levee

mottled 10 YR 6/6 (brownish yellow) plastic, stiff clay. C horizon from Natural Levee
7/4 (very pale brown) mottled 10 YR 8/8 (yellow) silt loam matrix. From Point Bar

rown) mottled 10 YR 8/8 (yellow) silt loam matrix. Clay replaced rapidly with sand as
Point Bar association.

outh wall profile of Trench 3.

Based on the 1966 edition of the U.S. Geological Survey's North Bend quadrangle (1:24,000-scale), spoil excavated from the slip once formed a mound about 6.1 m (20 ft) high immediately adjacent to the slip on the site area. Based on the location, height, and shape of the mound, it is inferred that the excavation took place by a dragline operation. At some unknown date after 1966, the spoil mound was degraded and the majority of the material removed from the site area, leaving only Stratum 2 as evidence of its presence. The grading lowered the ground elevation to a level averaging about 50 cm (1.6 ft) below present.

Stratum 1. The shallowest unit at the site consists of 20 to 70 cm (0.66 to 2.3 ft) of mostly yellowish-brown (10YR 5/4) medium to coarse sand mixed with large quantities of oyster and *Rangia* shell and chert gravel. None of this material is available in the site area and obviously was hauled in by truck or barge. The deposit is the youngest at the site, having been deposited after 1966 and after the degrading of the spoil mound described above. It is unquestionably related to the latest industrial or commercial use of the site.

In summary, geomorphological and archeological evidence indicate that the eight strata described above reflect the origin of the landform and a series of human site uses and modifications over a period of perhaps a century and half or more. The stratigraphic record is essentially complete--no known or anticipated use or event is missing.

Trench 1. This trench was oriented north/south from N35 E25 to N10 E25. The profile of the entire east wall of the trench was recorded (Figure 10). Stratum 1 contained oyster, *Rangia*, and gravel. The average thickness of this stratum was 46 cm (18 in). Stratum 2 included small brick fragments, iron fragments, wood, roots, and very few ceramics. The average thickness of this stratum was 27 cm (11 in). Stratum 3 was devoid of cultural material and was 23 cm (9 in) thick. Underlying this was Stratum 4A, approximately 13 cm (5.1 in) thick. A large variety of artifacts including clear and flat glass, barbed wire, a strap hinge, tin cans, a wire nail, wire nail fragments, brick, and coal were collected from this stratum. Stratum 4B underlay Stratum 4A and was approximately 19 cm (7.5 in) thick. Material collected from this stratum included brown, clear, and cobalt glass. Stratum 5 averaged 24 cm (9.4 in) in thickness and was followed by Stratum 6, the final stratum encountered in this trench. Stratum 6 was approximately 48 cm (19 in) thick.

Trench 2. Trench 2 was also oriented north/south from N35 E15 to N10 E15. A complete profile was drafted of the east wall of the trench (Figure 11). Stratum 1 was approximately 43 cm (17 in) thick. It was underlain by Stratum 2, which was approximately 51 cm (20 in) thick. Stratum 3 averaged 16 cm (6.3 in) in thickness. Stratum 3 overlay Strata 4A and 4B, each averaging 14 cm (5.5 in) in thickness. Material collected from Trench 2 was collected only from Stratum 4A and included amethyst, clear, and cobalt glass; Kerr canning jar glass; a cobalt medicinal bottle with a metal cap; a boot clasp; a brass wick holder; cast iron stove fragments; a tin can, unidentifiable metal fragments; brick; clinker; and slate. Stratum 5, approximately 36 cm (14.2 in) thick, was followed by Stratum 6, approximately 25 cm (10 in) thick.

Trench 3. Trench 3 was located from N25 E10 to N25 E30 and was oriented east/west. The south wall of the trench was profiled in its entirety (Figure 12). As was the case in the previous trenches, Stratum 1, measuring approximately 36 cm (14.2 in) thick, was the uppermost stratum. It was followed by Stratum 2, which was approximately 44 cm (17.3 in) thick. Stratum 3 averaged 7 cm (3 in) in thickness. Below Stratum 3 were Strata 4A and 4B, averaging 4 cm (1.6 in) and 17 cm (6.7 in), respectively. Stratum 5 was encountered

below these and averaged 55 cm (22 in) in thickness. Stratum 6 was not encountered in Trench 3.

Between E30 and E25, Trench 3 was excavated to 3.60 m (11.8 ft) in order to provide a deep stratigraphic profile for geomorphological examination. The bottom of Stratum 5 extended 2 m (6.6 ft) below ground surface. This was followed by a 10 cm (4 in) transition lens between Strata 5 and 7. Stratum 7 was a 10YR 7/4 (very pale brown) silt loam mottled with 10YR 8/8 (yellow). The stratum, which has a point bar association, became increasingly sandy with depth. The average thickness of Stratum 7 was 120 cm (47.2).

Excavation Units

Excavation Unit N31 E16. This unit was located along the eastern edge of Trench 2 approximately 13 m (43 ft) south of the GIWW (Figure 9). Excavation was undertaken in 5 cm (2 in) arbitrary levels due to the presence of Strata 4A and 4B in the Trench 2 east wall profile (Figure 11). Prior to excavation, the unit was stripped of approximately 90 cm (35.4 in) of overburden by a backhoe (Figure 13). A thin layer of Stratum 3 remained above the intact Stratum 4A. This layer was removed to expose Stratum 4A across the entire unit. A wide variety of historic ceramics, glass, unidentified metal, brick fragments, a complete glass bottle, bone, animal teeth, and coal fragments were collected from this stratum. The stratum was approximately 10 cm (4 in) thick. Stratum 4B underlay Stratum 4A. Cultural materials were recovered only from the upper 2 cm (0.8 in) of this stratum. These included a metal spike; two historic sherds; oyster shell; clear and brown glass; bone; an animal tooth; an amorphous lump of melted coal; glass; and brick. Stratum 5, a 10YR 4/1 (dark gray) mottled 10YR 6/6 (brownish yellow) plastic, stiff clay, C horizon from natural levee association, was encountered below Stratum 4B. Excavations were terminated within this sterile stratum.

Excavation Unit N29 E14. This unit was located along the western edge of Trench 2 approximately 8 m (26.2 ft) south of the GIWW (Figure 9). Excavation was undertaken in 10 cm (4 in) arbitrary levels. Prior to excavation, approximately 90 cm (35.4 in) of overburden was mechanically stripped from the excavation unit (Figure 14). Twenty-two centimeters (9 in) of Stratum 3 overlay Stratum 4A. A large amount of unidentified metal was recovered from this stratum, as well as a cup handle; other historic ceramic sherds; brick fragments; bone; clear, amber, green, amethyst, and brown glass; and a stone marble. Plow scars were encountered approximately 50 cm below the unit datum (bd) (20 inbd), just below the contact between Strata 4A and 5 (Figure 15). The plow scars were oriented east/west and were filled with Stratum 4A matrix. Excavation was terminated at this depth, and the plan view of the plow scars was drawn and photographed.

Excavation Unit N33 E25. This unit was located along the western edge of Trench 1, approximately 13 m (43 ft) south of the GIWW (Figure 9). Excavation was undertaken in 10 cm (4 in) arbitrary levels. Prior to excavation, approximately 83 cm (33 in) of overburden was mechanically removed from the excavation unit (Figure 16). As was the case in the above units, a thin layer of Stratum 3 was removed in order to expose the natural Stratum 4A across the entire unit. Exposure of Stratum 4A revealed several intact bottles, bottle fragments, a door handle, cast iron stove door fragments, bone, historic ceramics, nails, iron fragments, an iron can top, and glazed and unglazed brick fragments across the unit (Figure 17). A plan view was drafted, and photographs were taken before excavation of Stratum 4A commenced. Additional material recovered from Stratum 4A included one 2/3 penny common head machine cut nail; a cow tooth; cow, pig, and chicken bones; and oyster shell. The thickness of Stratum 4A was approximately 16 cm (6.3 in). Stratum 5 was revealed below Stratum 4A. Excavation was terminated when Stratum 5 was encountered.

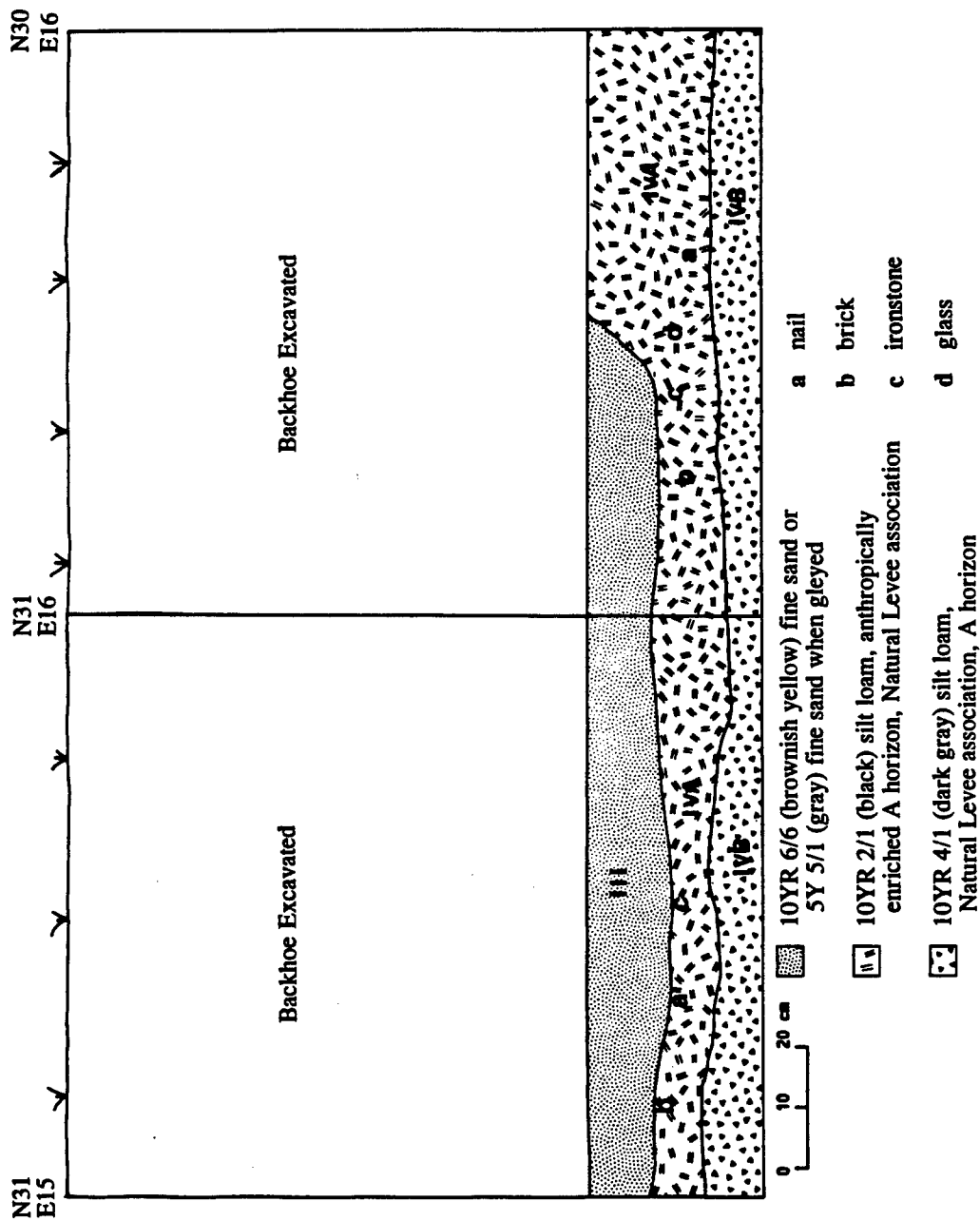


Figure 13. North and East profiles from EU N31 E16.

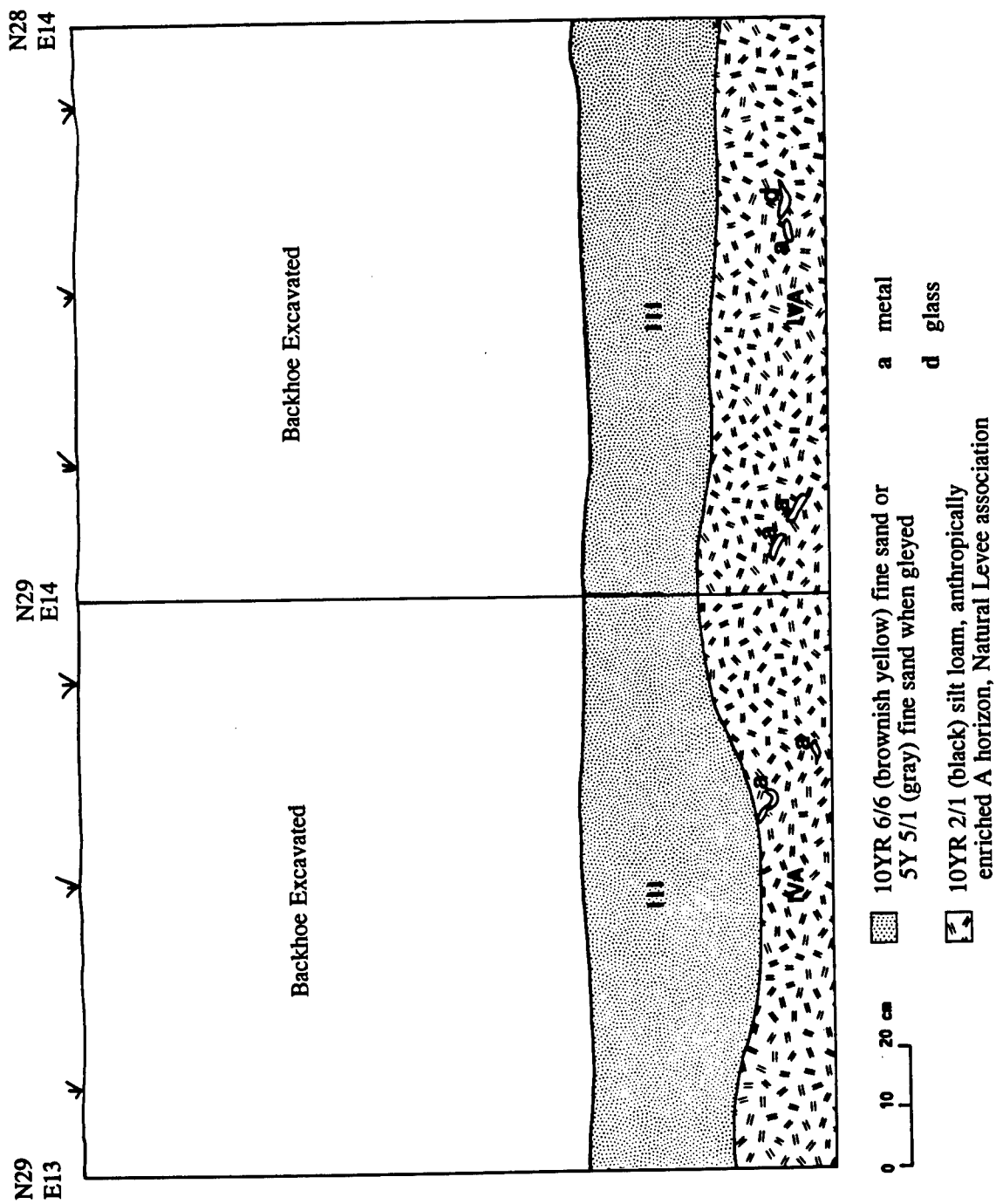
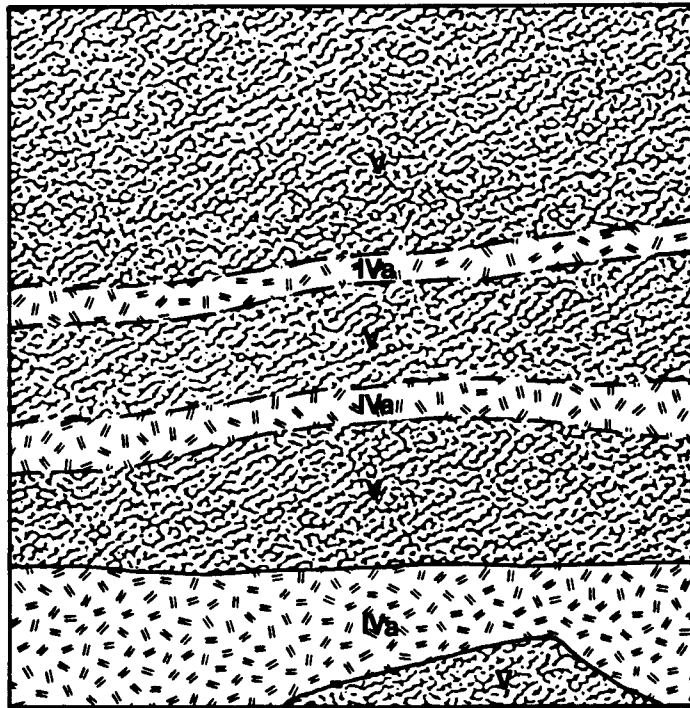


Figure 14. North and West profiles of EU N29 E14.

N29
E14

N29
E15



10
0 20 cm



10 YR 2/1 (black) silt loam matrix. Anthropically enriched A horizon. Natural Levee association.



10 YR 4/1 (dark gray) mottled 10 YR 6/6 (brownish yellow) plastic, stiff clay. C horizon from Natural Levee association.

Figure 15. Planview of EU N29 E14 (42 cmbld).

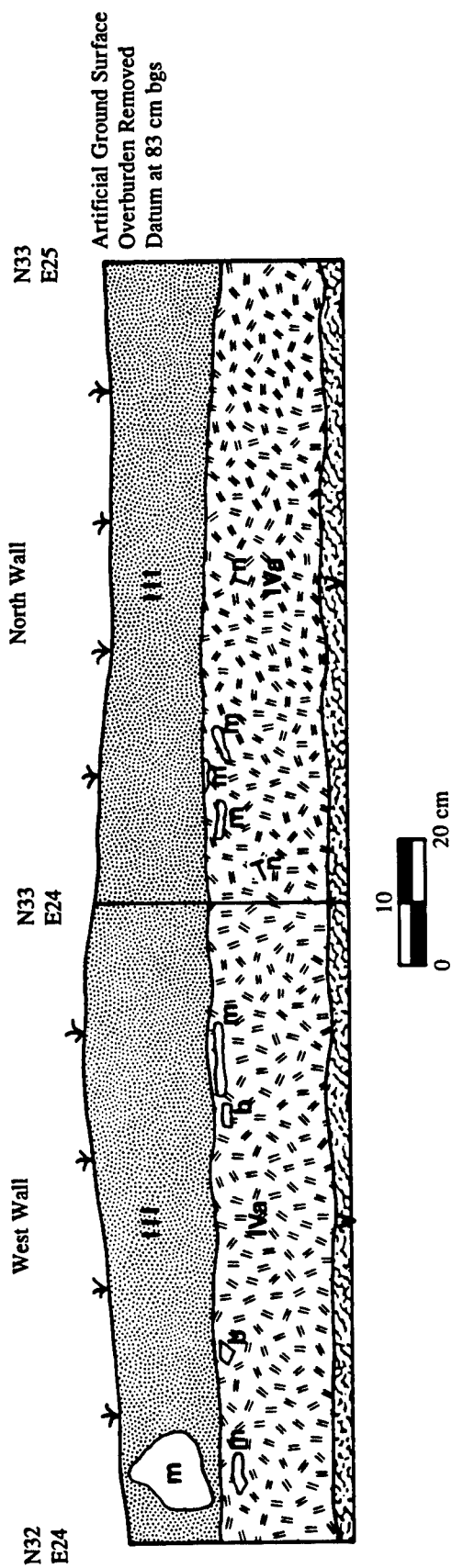
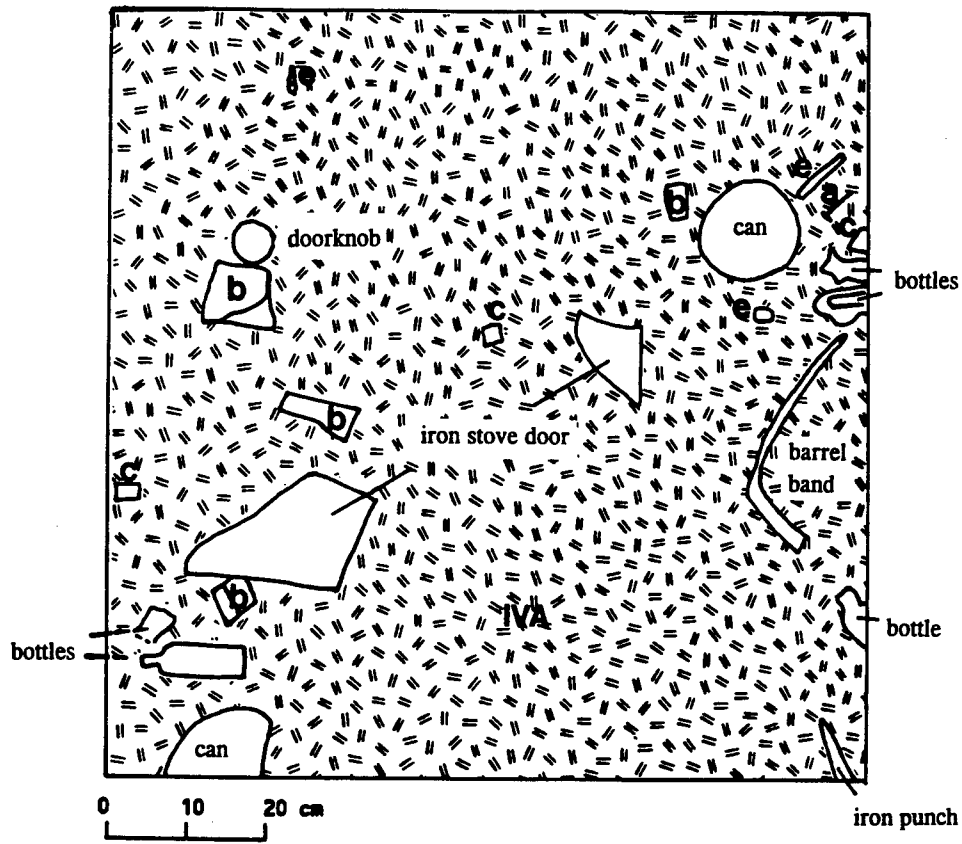


Figure 16. North and East profiles of EU N33 E25.

N33
E25



a nail

b brick

c ironstone

e bone


 10YR 2/1 (black) silt loam, anthropically enriched A horizon, Natural Levee association

Figure 17. Planview of EU N33 E25, top of Stratum IVa (30 cmbld).

Excavation Unit N31 E25. This unit was also located along the western edge of Trench 1, approximately 15 m (39.4 ft) south of the GIWW (Figure 9). Excavation was undertaken in 10 cm (4 in) arbitrary levels. Prior to excavation, approximately 86 cm (34 in) of overburden was mechanically stripped from the excavation unit (Figure 18). As was the case in other units, a thin layer of Stratum 3 was removed in order to expose the underlying culture bearing stratum. Exposure of Stratum 4A revealed barbed wire, bone, a can, brick, and unidentifiable metal fragments across the unit. A plan view was drafted, and photographs were taken at this point (Figure 19). Additional material recovered from excavation of Stratum 4A included a railroad spike; nail fragments; clear and brown glass; faunal material; brick fragments; a complete bottle; and historic sherds. Stratum 4A was approximately 14 cm (5.5 in). Stratum 5 was revealed below Stratum 4A, and excavations were terminated at this depth.

Interpretation

At some point during the nineteenth century, probably after 1830, the site vicinity was first utilized for sugar cane agriculture. Following the turn of the twentieth century, land-use emphasis shifted from agricultural to habitation with the consolidation of North Bend Plantation and the construction of quarters housing in the area (Figures 20 and 21; see also Chapter 4). Human occupation of the site vicinity extensively modified or altered the silt loam A horizon which developed at the top of the natural levee sequence. Changes noted in Stratum 4A include the introduction of organic material into the soil horizon, which darkened it considerably. Also, artifacts discarded by former inhabitants of the area was introduced into the silt loam matrix. In other words, the use of the upper portion of the natural levee by humans altered the natural soil horizon to form a midden.

During the initial phase of midden development (Stratum 4A), discarded artifacts and organic remains were probably trampled into the top of the natural levee A horizon (Stratum 4B). The lack of architectural features and the irregular, discontinuous nature of Stratum 4A suggests that this area was not immediately adjacent to a quarters cabin. Moir's (1982:139-152) and Michie's (1990:92-93) research on tenant and slave contexts indicates that artifact density tends to increase with distance from the cabin, probably as a result of sweeping debris from the yard (Orser 1988a:135). This is consistent with the artifact distribution noted at 16SMY66; artifacts were more plentiful in the southern portion of the site (Figures 20 and 21). Then too, the color of Stratum 4A changes from black (10YR 2/1) to dark gray brown (10YR 4/2) as one moves from north to south. Such gradations in soil color, as well as variability in the thickness of culture-bearing strata are typical of quarters contexts (viz. Yakubik et al. 1994) and is not indicative of disturbance. Midden is generally darker in the vicinity of the cabins as a result of human activity in close proximity to the structures, and it tends to thin/exhibit irregularities toward the edges of the yard.

Subsequent to the development of Stratum 4A and the abandonment of the quarters cabins, dredged point bar soil (Stratum 3) was placed in the site area, sealing the majority of the cultural deposits. The introduction of the point bar material on the site coincides with the construction of the GIWW in 1933. Portions of Strata 3, 4A, 4B, and 5 were removed along the southern periphery of the site and replaced by a medium to coarse sand, designated Stratum 6. This intrusive episode occurred between 1933 and 1975, when the Lambert Industries asphalt plant was constructed on the site. The dredging of Bayou Sale is represented by the rich organic clays labeled Stratum 2. Modification of Bayou Sale occurred after Stratum 6 was introduced since Stratum 2 overlay it in all backhoe trenches. Stratum 1, composed of coarse sand and shell, was placed on the site after Bayou Sale was dredged and probably functioned as a hard surface for vehicle traffic for Lambert Industries.

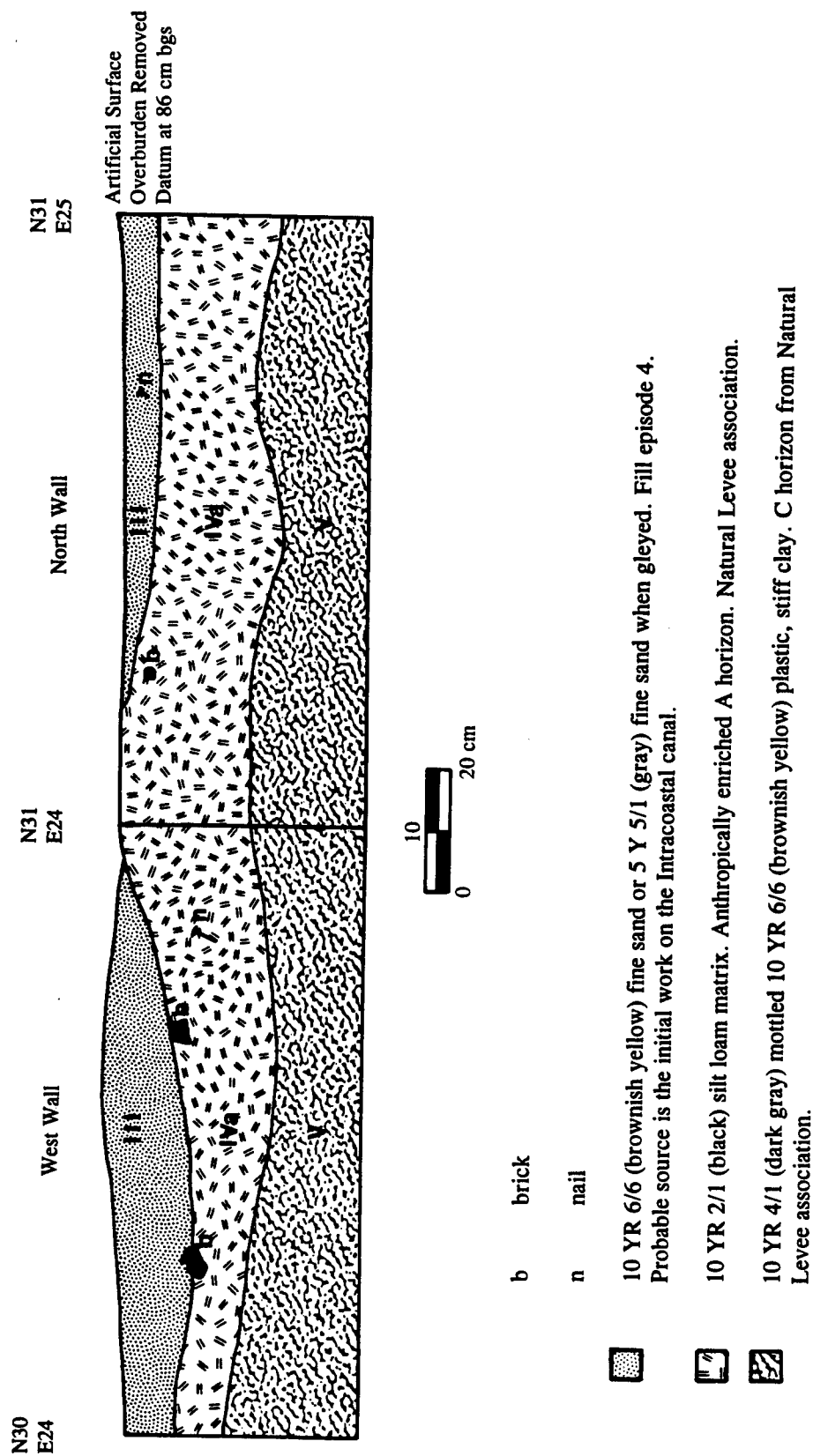


Figure 18. North and West profiles of EU N31 E25.

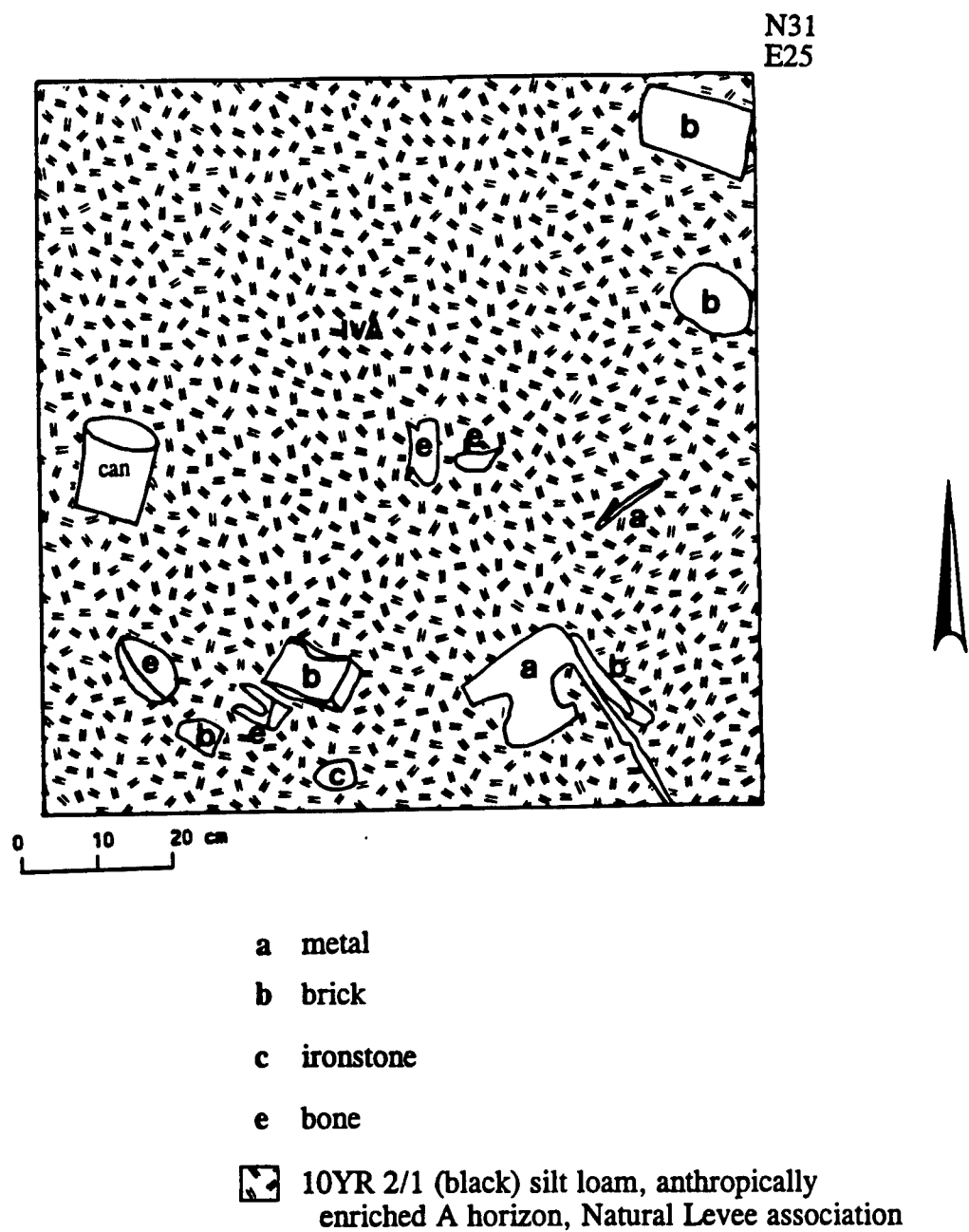


Figure 19. Planview of EU N31 E25, Stratum 4A at 13cm bld.

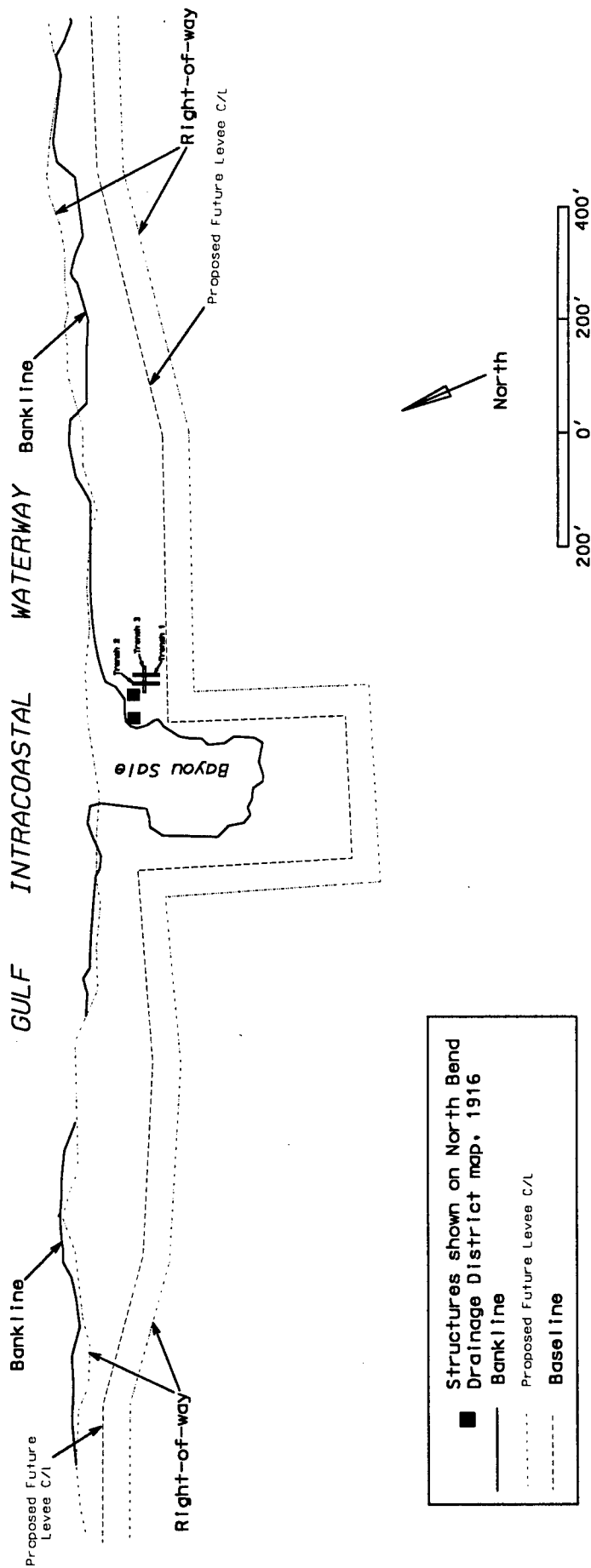


Figure 20. Map of 16SMY66 showing the projected locations of structures illustrated on a 1916 map of North Bend Plantation.

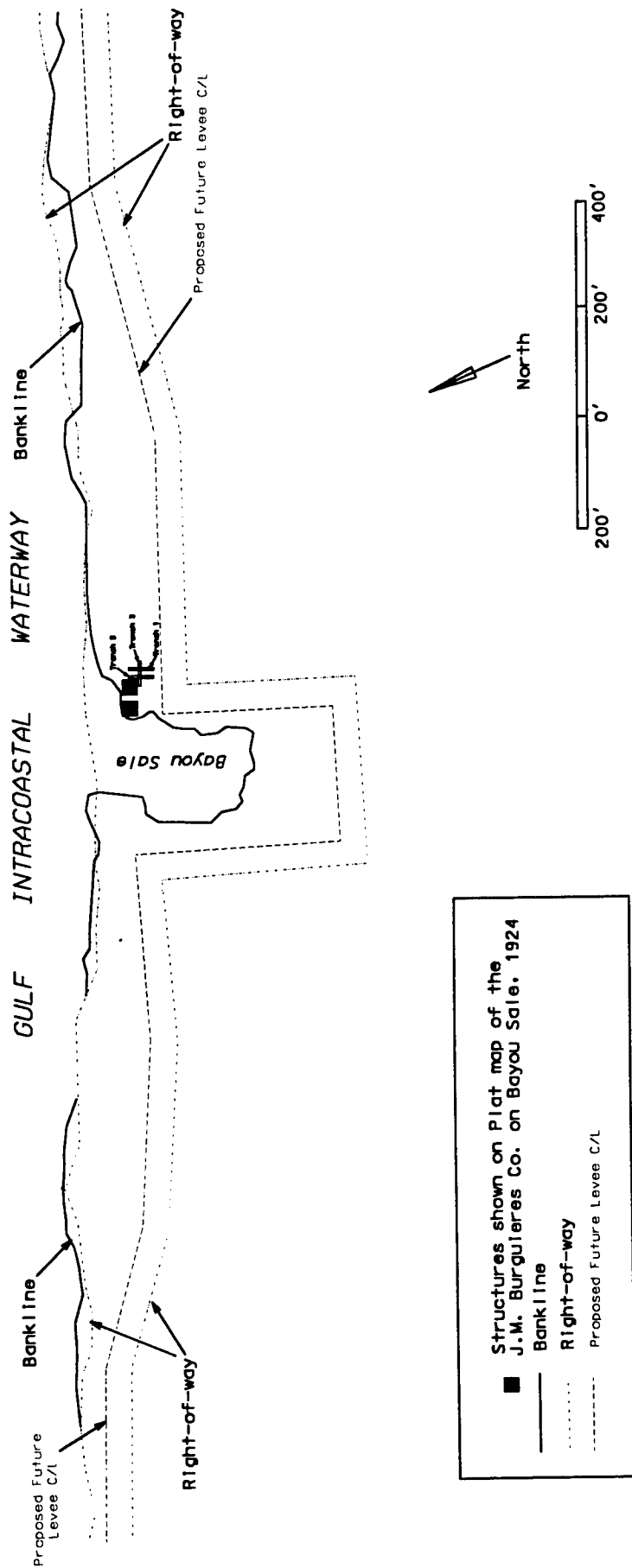


Figure 21. Map of 16SMY66 showing the projected locations of structures illustrated on a 1924 map of North Bend Plantation.

Correlation of the stratigraphic sequences revealed at 16SMY66 and 16SMY132 is summarized in Table 4. Description of the sequence at 16SMY66 utilized stratum and soil horizon, standard units which may be distinguished by differences in lithology, mineralogy, or physical properties (Hedberg 1976; Holliday 1992). The descriptive nomenclature used at 16SMY132 utilized "allolayers" and "zones" (Kuttruff et al. 1993:27). Allolayers are defined and mapped based on persistent unconformities rather than lithology (Kuttruff et al. 1993:27). Zone is used "to refer to a natural or cultural stratigraphic unit" (Kuttruff et al. 1993:65). Although seemingly different, the strata recorded at 16SMY66 and allolayers recorded at 16SMY132 are very similar when their respective descriptions are compared. By contrast, horizon and zone appear to be only broadly equivalent, since zone 5 may be the correlate of two very distinct and different strata (Table 4). Consequently, correlations between horizon and zone should be viewed as tenuous.

One noticeable difference between the sequences is the lack of a correlate at 16SMY132 for the point bar association (Stratum 7) discovered at 16SMY66. This is not surprising since subsurface investigations at 16SMY132 rarely reached 2 m below ground surface and the point bar association began at this depth. In addition, the fill episode Stratum 6 at 16SMY66 did not have a correlate north of the GIWW.

The C horizon of the natural levee (Stratum 5) identified at 16SMY66 is equivalent to zones 7 and 8 of allolayer 1 in Section 1 and zones 6 and 7 in Section 2 on the east bank of 16SMY132. The C horizon was also identified as zone 5 in Excavation Unit 1 by Kuttruff et al. (1993:65). No equivalent deposit was identified on the west bank of Bayou Sale at 16SMY132.

Precise correlation of deposits representing the A horizon of the natural levee is more difficult. This is possibly the result of the differences in context at 16SMY66 and 16SMY132. While excavations at the latter were immediately adjacent to the locations of standing structures, excavations at the former were on the periphery of the habitation area (Figure 20 and 21). The description of the upper portion of allolayer 1 is very similar to Stratum 4B, but zone 4, the upper portion of allolayer 1 on the east bank, is described as containing late-nineteenth- and early-twentieth-century material culture. Zone 5, located on the west bank of 16SMY132, is also in the upper portion of allolayer 1 and is described as being contemporaneous with the sugar refining operations at North Bend Plantation. By their definitions, zones 4 and 5 would correspond more closely with Stratum 4A at 16SMY66 rather than Stratum 4B (Table 4).

The midden deposit (Stratum 4A) at 16SMY66 corresponds very well to allolayer 2 at 16SMY132; but zone correlation is somewhat problematic. The lack of precise correlation is probably related to the fact that "Additional work will be needed to clarify the precise history and origin of these sediments in relation to the brick foundations that they enclose" (Kuttruff et al. 1993:30). In addition to the two zones noted above, zones 3 and 4 on the west bank of 16SMY132 are described as midden deposits dating to the late-nineteenth and early-twentieth centuries and would be roughly coeval with the midden deposit at 16SMY66 (Table 4).

Soil associated with the dredging of the GIWW at 16SMY66 does not have an equivalent at 16SMY132, but spoil associated with the dredging of Bayou Sale was definitely identified on both sides of the GIWW. The rich organic clays composing Stratum 2 at 16SMY66 are the same as those noted for allolayer 3 and for zones 1 and 2 on the west bankline at 16SMY132. Stratum 1, a sand and crushed shell fill, corresponds very well with the description of allolayer 4 and zones 1, 2, and 2A of the east bank at 16SMY132. No equivalent of Stratum 1 was located on the west bank of Bayou Sale at 16SMY132.

Table 4. Stratigraphic Correlations, 16SMY66 and 16SMY132.

16SMY66 Strata	Type	16SMY132 allolayers	Type	16SMY132 East	Type	16SMY132 West
1	sand/shell fill	4	shell paving	zone 1,2,2A	sand/shell fill	N/A
2	clay/dredged slip	3	dredged slip	zone 3/pre-dredge	shell paving	zone 1 and 2
3	sand/dredged point bar	N/A	N/A	N/A	N/A	N/A
4A	midden/enriched A	2	midden/enriched A	zone 4	silt loam	zone 3 and 4
4B	A horizon/natur al levee	1	A horizon/possible correlation	zone 4	silt loam	zone 5
5	C horizon/natur al levee	1	silt loam	zone 5	silty clay	N/A
6	sand/off site fill	N/A	N/A	N/A	N/A	N/A
7	fine sand/point bar	N/A	N/A	N/A	N/A	N/A

Summary of Investigations at 16SMY66

Test excavations at 16SMY66, consisting of the excavation of three trenches and four 1 x 1 m units, revealed the presence of an intact cultural deposit at a depth of approximately 90 cm below present ground surface. Artifacts recovered from within this midden consisted of domestic debris, including ceramics, glass, architectural debris, and faunal material. This material undoubtedly derives from the occupation of the quarters cabins formerly located in this area. As noted in Chapter 4, documentary evidence suggests that these cabins were probably constructed after the 1905 consolidation of Stokely Vinson Plantation with North Bend Plantation. Analyses of artifacts presented in the following chapter support a post-1905 occupation date for this area.

CHAPTER 7 LABORATORY ANALYSES

Artifact Analysis

Artifacts recovered from 16SMY66 are presented in Tables 5 through 10 (Plates 2 - 3). Materials recovered in the field were washed, sorted, and identified. Ceramics were analyzed utilizing the classification summarized below. Glass was described by color, manufacturing attributes, and function when identifiable; at minimum, sherds were sorted by color and counted. Nails were classified and dated as described below. Other artifacts were described and dated as possible. Various cultural materials collected from the excavation units were weighed as well as counted. These included architectural debris, coal, cinders, and shell.

Ceramics. A total of 102 sherds of ceramics were collected from 16SMY66 (Table 5). The majority of these (n=76) were late-nineteenth/early-twentieth-century ironstone. Ironstone, sometimes referred to as stone china or white granite, has a refined white-colored earthenware paste. Worthy (1982:335-337) classifies it as a white stoneware, yet states that the body is "almost vitreous." Since stonewares by definition are vitrified, this precludes the classification of ironstone as a stoneware.

Ironstone was developed in England and was produced in the United States at a slightly later date (Ramsey 1947:153). Miller (1991:10) has indicated that it was being imported to the United States by the 1840s. Barber (1902:19) states that the formula for ironstone is similar to that used in all white ceramic wares, namely flint, feldspar, kaolin, and ball clay. It has a hard white, and often thick and heavy ceramic body. It is semivitreous, whereas whiteware is nonvitreous. Ironstone fractures evenly and smoothly. The surface appearance is hard and smooth, usually with an opaque-looking glaze with a blue-gray cast. It is frequently undecorated, or decorated with only molded relief. However, transfer-printing is not uncommon, particularly on late-nineteenth- and early-twentieth-century examples. Decorative motifs usually consist of floral patterns, unlike the primarily scenic transfer-prints found until the mid-nineteenth century on pearlware and whiteware. Decalcomania is also common after ca. 1900. In addition, ironstone is sometimes found with gilt decoration.

Heavy-bodied ironstone declined in popularity at the end of the nineteenth century in favor of lighter-weight, usually decorated, semivitreous wares. However, the heavy-bodied ware was still readily available at least as late as 1895 (Majewski and O'Brien 1987:123-124). The ironstone from the 16SMY66 collection were all relatively thin-bodied, which would be consistent with a post-1905 occupation date for the area.

Twenty-one sherds of porcelain were collected. Hard-paste porcelain is completely vitrified and translucent. It is made from kaolin and petunse (feldspar, or potassium aluminum silicate), and it approaches a glass in composition because of the high firing temperature (1300-1450° C.). The paste tends to fuse with the feldspathic glaze during firing. The ware fractures conchoidally. The surface appearance is hard and smooth, and the surface color ranges from very white to white with a gray, blue, or green cast (Miller and Stone 1970:81; Noel Hume 1970:257-263). Porcelain can receive a variety of surface treatments, although only cobalt decoration may be applied underglaze due to the heat necessary to mature the clay.

Soft-paste porcelain differs from hard-paste porcelain in the use of fluxing agents, such as ground glass frits or bone ash, to lower the firing temperature required to mature the clay. The color of soft-paste porcelain ranges from white to pale buff. While the paste is vitreous, it has a somewhat granular texture. There is a clear division between paste and glaze when viewed in cross-section, and it is somewhat less translucent than hard-paste.

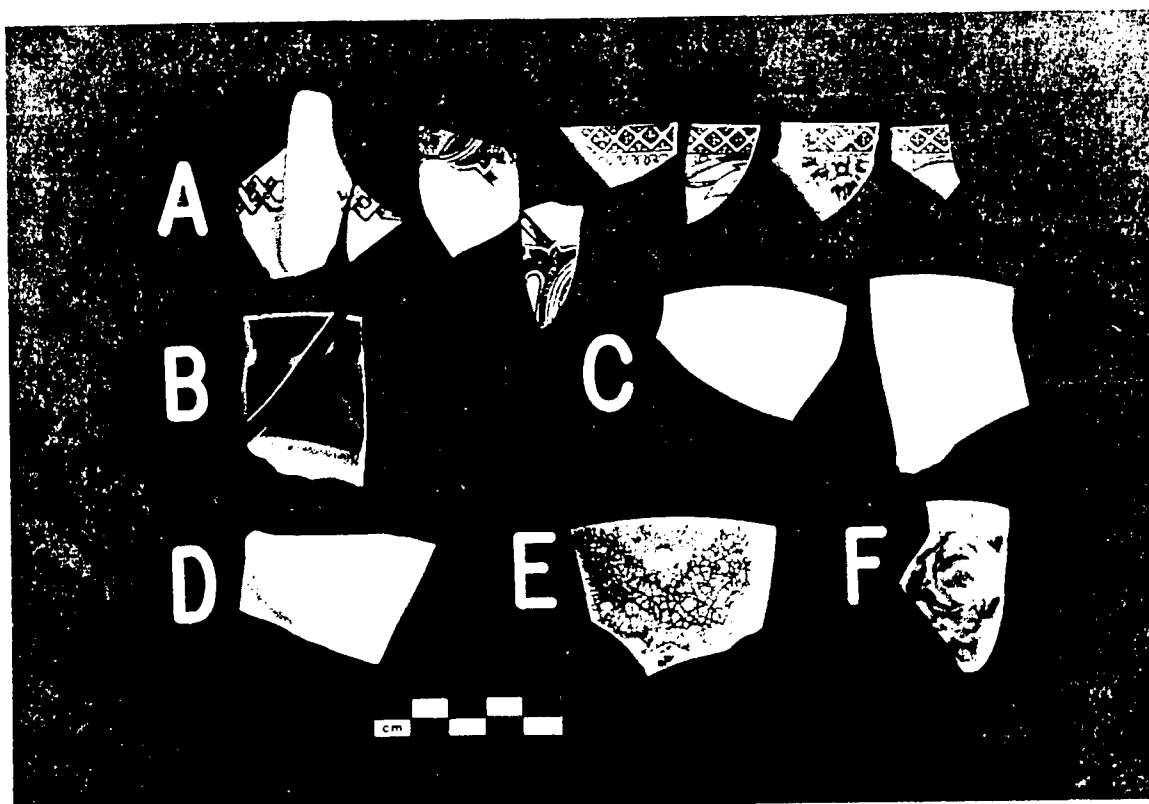


Plate 2. Selected ceramic artifacts from 16SMY66. A) green transfer-printed ironstone; B) flow blue ironstone; C) porcelain; D) ironstone cup base; E) ironstone bowl rim; and F) overglaze transfer-printed and hand painted porcelain.



Plate 3. Selected glass bottles from 16SMY66.

Table 5. 16SMY66 Ceramic Artifacts.

	Auger Test N30 E20	Trench 1 Str. 4a	Trench 1 Str. 4b	Trench 2 Str. 4a	N29 E14		N31 E16			N31 E25		N33 E25		TOTAL
					Str. 4a Level 1	Str. 4a Level 2	Str. 3 Level 1	Str. 4a Level 1	Str. 4a Level 2	Str. 4b Level 1	Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	
Ironstone	1	3		10	11	1	6	15	1	2	4	3	5	62
Blue transfer-printed ironstone											2			2
Green transfer-printed ironstone					6	4								10
Flow blue ironstone					2									2
Porcelaneous stoneware					3									3
Porcelain				1	9	2			2		2		1	17
Blue hand-painted porcelain													1	1
Overglaze hand-painted porcelain								1	2					3
Yellowware						1								1
Slip-glazed redware			1											1
TOTAL	1	3	1	11	31	8	6	16	5	2	8	3	7	102

Table 6. Minimum Vessel Estimates, 16SMY66.

	Plate	Bowl	Cup	Saucer	Unid	Total
Ironstone	4	1	3	1		9
Blue transfer-printed ironstone	1					1
Green transfer-printed ironstone			1			1
Flow blue ironstone	1					1
Porcelaneous stoneware			1			1
Porcelain				1		1
Blue hand-painted porcelain			1			1
Overglaze hand-painted porcelain			1			1
Yellowware					1	1
Slip-glazed redware					1	1
Total	6	1	7	2	2	18

Table 7. 16SMY66 Glass Artifacts.*

	S.T. 12	Trench 1 Str. 4a	Trench 1 Str. 4b	Trench 2 Str. 4a	N29 E14		N31 E16		N31 E25		N33 E25		TOTAL
					Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	Str. 4a Level 2	
Amethyst bottle glass				1	6	2	2		4	1	10		26
Light blue/green glass					3	4						4	13
Light blue/green glass bottle stopper					1								1
Light blue/green soda bottle glass													25
Brown glass			1		2	7	1	1		3	5	1	21
Brown case bottle glass									6				6
Clear glass	3	2	3	2	8	9			3	4	21	2	70
Clear liquor bottle glass								26					26
Clear glass lamp globe					1								1
Clear glass tumbler									6				19
Cobalt glass			1	2							3		6
Dark green wine bottle glass					2	2	1						5
Flat glass		2					1						3
Kerr canning jar glass				1									1
Light blue bottle glass						3	8	4		1	3	1	26
Milk glass cosmetic container							4	4					8
Pressed glass bowl									2				2
TOTAL	3	4	5	6	23	27	29	35	31	9	57	8	259

*Does not include whole bottles

Table 8. Complete Bottles from 16SMY66.

Bottle Type	Provenience	Manufacturer	Date Range	References
Cobalt medicinal with metal cap	Trench 2 N28.3 E15 Str. 4a	Maryland Glass Corp.	1916-date	Toulouse 1971:339-341
Flint ball neck panel medicinal	N31 E16 Str. 4a Level 1	Owens Bottle Co.	1911-1929	Toulouse 1971:393
Flint ball neck panel medicinal	N33 E25 Str. 4a Level 1	Illinois Glass Co.	1916-1929	Toulouse 1971:264
Flint sauce	N31 E25 Str. 4a Level 2	Owens Bottle Co.	1911-1929	Toulouse 1971:339-341
Flint stands round glue	N33 E25 Str. 4a Level 1	Unknown	post 1903	Putnam 1965:59

Table 9. Metal Artifacts from 16SMY66.

	Trench 1		Trench 2		N29 E14		N31 E16				N31 E25		N33 E25		TOTAL
	Str. 4a	Str. 4a	Str. 4a	Str. 4a	Str. 4a Level 1	Str. 4a Level 2	Str. 3 Level 1	Str. 4a Level 1	Str. 4a Level 2	Str. 4b Level 1	Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	Str. 4a Level 2	
Barbed wire	1										1				2
Barrel band													1		1
Boot clasp			1												1
Brass wick holder			1												1
Brass screw															1
Cast iron stove frag.			3		1	4					1	2			11
Gray enameled metal								6							6
Nut										1					1
Punch													1		1
Railroad spike										1	1				2
Strap hinge	1														1
Tin can	4	1			55			6	1	6	45	9	1		128
Wire nail	1			1	2				2				6		12
Wire nail fragments	2			6	15			9	7	3		1	37	4	84
Machine cut nail													1	1	2
Zinc canning jar lid									1						1
Unid. metal			2			8	4	23	9	5	5			2	58
TOTAL	9	8		19	73		4	44	21	16	53	12	47	7	313

Table 10. Other Artifacts from 16SMY66.

	Auger Test N30 E20 111-116 cm	Trench 1		Trench 2		N29 E14				N31 E16				N31 E25				N33 E25				TOTAL
		Str. 4a	Str. 4a	Str. 4a	Str. 4a	Str. 4a Level 1	Str. 4a Level 2	Str. 3 Level 1	Str. 3 Level 2	Str. 4a Level 1	Str. 4a Level 2	Str. 4b Level 1	Str. 4b Level 2	Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	Str. 4a Level 2	Str. 4a Level 1	Str. 4a Level 2	
Brick (count)	1			1		7	1	2		4	4	1		6	5	13	5				5	50
Brick (wt in g)	0.6			214.0		194.0	59.4	101.5		44.9	83.9	10.1		3146.3	67.5	1454.3	77.4					5453.9
Clinker (count)							1					1			2	1						7
Clinker (wt in g)				8.6			14.0					4.5	23.0		82.8	3.7						136.6
Coal (count)	1					4	1	1			3			3	1	5	4					23
Coal (wt in g)	0.7					42.8	5.0	7.6			8.5			24.5	9.3	7.1	15.4					120.9
Door knob																1						1
Oyster (count)						1	1			1		1				1	1					6
Oyster (wt in g)						12.3	7.6			47.7		87.5				2.9	70.0					228.0
<i>Rangia</i> (count)											1						1					2
<i>Rangia</i> (wt in g)											0.4						2.8					3.2
Slate (count)		1									1					1						3
Slate (wt in g)		0.8									23.2					4.8						28.8
Shoe heel														1								1
Stone marble						1																1
Wood (count)				1																		1
Wood (wt in g)				0.2																		0.2
TOTAL	2	1	3			13	4	3		5	10	3		10	8	22	11					95

Hard-paste porcelain was first manufactured by the Chinese in the eighth century (T'ang Dynasty). Chinese porcelain came into such demand that, by the eighteenth century, Oriental potters were manufacturing porcelain exclusively for export to western markets. Oriental porcelain is found in British colonial contexts as early as the first half of the seventeenth century (Noel Hume 1970:257). It is also recovered on French (Miller and Stone 1970:81) and Spanish colonial period sites (Deagan 1987).

The first European hard-paste porcelain was produced at Meissen in 1709. Soft-paste porcelain manufacture began in France in the late-seventeenth century, and in 1769 hard-paste was first produced at Sevres. Soft-paste porcelain manufacture also began early in England at Bow, Chelsea, and Derby. In addition to the use of glass frits, bone ash was utilized as a flux in England as early as 1750. Spode is usually credited with perfecting and standardizing the English "bone china" formula ca. 1790. The discovery of kaolin deposits in Cornwall led to the founding of the Plymouth factory in 1768, which produced the first English hard-paste (Wynter 1972; Cotter 1968).

By the later-nineteenth century, relatively inexpensive porcelains were being mass produced for the American market by manufacturers such as Haviland and Company. Undecorated French porcelains provided competition for American and British ironstones during this period. Commercially successful hard-paste porcelains were not manufactured in the United States until ca. 1880.

One sherd of a slip-glazed redware was collected at 16SMY66. Red-colored earthenware was frequently used for utilitarian vessels. The paste of red-colored earthenware ranges from deep red-brown to orange to pink depending on the amounts of impurities in the clay and the firing temperature and atmosphere. The body, which is fired at low temperatures, is usually light and porous; complete vitrification cannot be achieved with pure earthenware clays. Consequently, redwares tend to be more fragile than stonewares or porcelains (Rhodes 1973:47).

Due to the wide availability of red-colored earthenware clays and because they become hardfired between 950-1100° (Rhodes 1973:22), utilitarian redwares are ubiquitous and, with some exceptions, relatively non-diagnostic for dating purposes. Since the ceramic is porous, it was usually glazed to make it impermeable to liquids. Unglazed, redware was (and is) used for flower pots and water coolers. Most commonly redware is found with a clear lead or alkaline glaze. Glazes tinted with coloring oxides are also frequently found. Slip glazes are only when the red-colored earthenware clay has been combined with more refractory clays, such as stoneware or fire clay. This is because slip glazes generally need higher firing temperatures than red-colored earthenware clays can tolerate before melting.

Finally, one sherd of yellowware was recovered. Yellow-colored earthenware is an American coarse utilitarian body type. The paste in fact consists of stoneware, not earthenware clays, but the ware is classified as an earthenware because it is not fired to vitrification. The paste ranges from soft and porous in low-fired examples to nearly vitrified pieces which have been fired at high temperatures. The paste color is buff to brownish yellow, and varies with the amounts and types of impurities in the clays and with the firing temperature. Surface treatment of the vessels varied with function. The variant known as yellowware is covered with a clear glaze. It was molded into a variety of utilitarian forms such as bowls, jelly-molds, pitchers, and mugs. After 1840, it is frequently found with annular bands in white, brown, and blue, as well as mocha decoration in blue or brown (Ramsey 1947:148-150). Yellowware was produced into the twentieth century.

Thus, the ceramic assemblage is consistent with a post-1905 occupation at 16SMY66; the majority of the ceramics are relatively-thin bodied ironstones with smaller numbers of

porcelain and a few porcelaneous stoneware sherds. Because mean ceramic dating (South 1972) is not reliable for such a late date without a heavy reliance on a large sample of dated makers' marks, this was not attempted. Similarly, index values for economic scaling for this period are not available (Miller 1980, 1991). However, minimum numbers of vessels were estimated. One advantage to this technique is that it provides a more realistic idea of the number of whole dishes or vessels actually represented in an assemblage. A single plate may break into dozens of sherds, but those sherds still only represent one item. Similarly, utilizing minimum vessel estimates rather than sherd counts serves to equalize categories somewhat when undertaking functional analyses. Functional classifications often are over-weighted toward "kitchen" artifacts, which most ceramics represent.

Minimum ceramic vessel estimates are presented in Table 6. A plurality of the vessels were cups, with plates being the second most common identified form. Interestingly, there was only one bowl, and only two saucers relative to the seven cups in the collection. The 18 vessels identified were represented by 10 separate decorative types. This is a very high ratio of ceramic types to number ceramic vessels (1:1.8) and is undoubtedly the result of the small size of the sample from the 16SMY66 (*viz.* Yakubik et al. 1994:10-53). Because sampling error would likely make formal comparisons to other collections meaningless, none were attempted.

Comparison of the ceramics from 16SMY66 to those found at 16SMY132 is somewhat complicated by the fact that Kuttruff et al. (1993) apparently refer to all refined white earthenwares as "whiteware." Thus, while it is possible that the undecorated whiteware found at the latter site is actually ironstone, this is by no means certain without re-examination of the collection. Interestingly, antebellum ceramics (e.g. pearlware) were collected at 16SMY132, while diagnostic material from the 16SMY66 ceramic assemblage dates exclusively to the late-nineteenth/early twentieth century. While this difference may be the result of sampling error, it is also possible that there was an earlier component at 16SMY132.

Glass A total of 259 glass fragments were recovered from 16SMY66, excluding whole bottles. Three clear glass fragments recovered during pedestrian survey are also included in this total (Table 7). All glass recovered from 16SMY66 was sorted by color. Whole bottles and diagnostic fragments were described by presumed function and/or shape whenever possible (Wilson 1981:110; Haskell 1981:Figure 32; Baugher-Perlin 1982).

Clear glass fragments (n=70) which could not be confidently placed within a functional category were the most prevalent type of glass recovered and found in all cultural and/or culturally modified strata. Clear or colorless glass is more common in contexts dating from the second half of the nineteenth century onward (Haskell 1981:28). Other clear glass fragments recovered included 26 fragments from a liquor bottle; 19 fragments from two glass tumblers; two fragments from a single pressed glass bowl; one fragment from an oil lamp globe/chimney; and finally one fragment from a Kerr canning jar.

Twenty-six fragments of amethyst glass were collected. The use of manganese oxide as a decoloring agent became widespread in the final third of the nineteenth century and continued through World War I. Glass treated with manganese oxide tends to become amethyst colored when exposed to sunlight (Toulouse 1969:534). Amethyst glass was recovered from both Strata 4a and 4b, but a clear majority came from Stratum 4a. Most fragments are from bottles, but the glass shreds were too fragmentary for further analysis.

Light blue glass fragments (n=39) were collected from both the backhoe trenches and hand excavated units. Thirteen fragments could not be safely placed into a functional category, but 26 fragments were from two soda bottles recovered the 1 m² units placed along the E 25

grid line. A light blue glass bottle stopper was recovered from unit N29 E24, Stratum 4a, Level 1.

Brown glass fragments (n=27) were also collected from both backhoe trenches and hand excavated units. Most fragments (n=21) represent beer bottles. Due to the fragmentary nature of the sample, it was not possible to confidently estimate the minimum vessel count. Six fragments clearly derive from a case bottle recovered from N31 E25, Stratum 4a, Level 1. This is surprising, considering most of the bottle shapes in the sample from this site are round.

Six fragments of cobalt glass are represented in the sample. These fragments are very similar in shape and thickness to the one whole cobalt bottle recovered from Trench 2, Stratum 4a. ESI believes that the six fragments probably comes from an undetermined number of bottles which are the same as the one collected from Trench 2.

Dark green (n=5) and light green (n=26) glass fragments represent wine and/or other liquor bottles. The dark green glass clearly represents a wine bottle, since an almost complete base with a kick-up was collected. The light green glass fragments are somewhat problematic. The shape and size indicated by the fragments are within the parameters of wine or liquor bottles; but the paucity of neck and lip portions makes placement in functional categories less than certain.

One milk glass cosmetic container (n=8) is represented in the sample from 16SMY66. Fragments were collected from both levels excavated in Stratum 4a, from unit N31 E16. The fragments collected fit together and indicate that only one vessel is present.

A total of five complete bottles were recovered from 16SMY66 (Table 8). Four of the five were made from clear glass while the fifth was produced from cobalt glass. Two of the clear glass bottles were ball neck, paneled, medicinal bottles. These bottles are identical, but were manufactured by two different firms. One of these bottles was produced by Owens Bottle Company between 1911-1929, while the other was produced by Illinois Glass Company between 1916-1929. These two manufacturers merged just after 1929 to become Owen-Illinois Glass Company (Toulouse 1971:264, 393). A third clear glass sauce (condiment) bottle was also produced by Owen Glass Company between 1911-1929 (Toulouse 1971:339-341). The last clear glass bottle is a round glue bottle produced by an unknown manufacturer some time after 1903 (Putnam 1965:59). The cobalt medicinal bottle was produced by Maryland Glass Corporation sometime between 1916 and the present (Toulouse 1971:339-341). The bottle has an intact metal crown style cap. The complete bottles recovered from 16SMY66 indicate an occupational range between 1903 and 1929 and represent medicinal, food preparation, and personal use vessels.

The glass assemblages from 16SMY66 and 16SMY132 are virtually identical. Clear or colorless glass was by far the most numerous type of glass recovered at both sites (Kuttruff et al. 1993:75-80, 94-95). Clear glass fragments and/or whole bottles constituted approximately 50 percent of the sample obtained at each site, and colored glass was recovered in similar quantities. Functionally, the samples are also very similar and represent food preparation/storage, kitchen, medicinal, and personal use categories. Finally, whole bottles from 16SMY66 clearly indicate an occupational range between 1903-1929. This span is compatible with the very limited temporal data obtained from 16SMY132 (Kuttruff et al. 1993:97).

Metal A total of 313 metal artifacts were collected from the trenches and hand excavated units at 16SMY66 (Table 9). Metal artifacts are grouped for convenience into functional categories which include architectural, domestic, economic, and personal items.

Metal artifacts included in the architectural category include wire and machine cut nails, a strap hinge, and barbed wire fragments. Twelve wire nails, 84 wire nail fragments, and two machine cut nails were collected during field investigations. Nails, as a whole, are only broadly datable. Prior to 1790, all nails were hand wrought. Between 1790 and the 1830s, early machine cut square nails came into general use. Machine cut square nails with wrought head were produced between 1790 and 1815, after which square cut nails had machined heads. This latter type has somewhat irregular heads and a "wasted" rounded shank under the head. Square cut nails with machined heads that lacked the "wasting" characteristic appeared ca. 1820. Wire nails were introduced ca. 1850, and they began to replace square cut nails by the third quarter of the nineteenth century (Nelson 1963; Hume 1970:252-254).

One strap hinge was recovered from Stratum 4a in Trench 1, as were two barbed wire fragments. Barbed wire, like nails, is only broadly datable, except when a specific style/type can be distinguished. Manufacture of barbed wire began late in the nineteenth century, ca 1880 (McCallum and McCallum 1965)). The two fragments in the sample from this site suffer from severe iron oxidation and accumulation making them useless for identification and temporal assignment.

The domestic functional category includes cast iron stove fragments, gray enameled metal fragments, tin can fragments, a complete brass lamp wick holder, barrel band fragments, and zinc canning jar lid fragments. Eleven cast iron stove fragments were collected from 16SMY66, and all of them derived from Stratum 4a. The stove fragments are believed to represent at least two different stoves based on their horizontal contexts. Six fragments, representing one vessel, of a gray enameled metal bowl were also collected from Stratum 4a. Tin can fragments (n=128) were collected from all cultural strata and excavation contexts at 16SMY66. Although tin cans were being produced early in the nineteenth century, their use did not expand until technological innovations during the mid-nineteenth century made the cans more reliable. In addition, production of tin cans during this time was controlled by the canning industry and linked to the processing plant. This situation changed by the mid-1880s, when the demand for tin cans rose sharply and a separate can producing industry began. The introduction of the double seam can in 1888 and the so-called solderless can in 1898 paved the way for mass producing reliable and efficient tin cans (Rock 1984:97-111). The most important temporal markers, the method of can manufacture and seaming and the type of lid, were not observable on the sample from 16SMY66 due to severe iron oxidation and accumulation. One barrel band fragment was collected from N33 E25, Stratum 4a, Level 1 and one zinc canning jar lid was collected from Stratum 4a in unit N31 E16. Finally, a complete brass lamp wick holder was collected from Trench 2, Stratum 4a. The cordage wick was still present in the holder.

The personal items functional category is represented by one artifact collected at the site. One metal boot clasp recovered from Trench 2, Stratum 4a. The economic activities functional category is also under-represented at 16SMY66. One punch, one nut, two railroad spikes, and one brass screw were the only artifacts collected. Fifty-eight unidentifiable metal fragments were also collected from 16SMY66.

As with other artifact classes, metal items recovered from both 16SMY66 and 16SMY132 are similar with two notable exceptions. Several shotgun shell bases representing at least two different gauges and rimfire cartridges were recovered from 16SMY132, while no firearm hardware was found at 16SMY66. Recovery of firearm-related artifacts supports the supposition that the laborers on North Bend Plantation supplemented their diet by hunting (below). Another difference between the two sites is the paucity of wagon hardware at 16SMY66 (wagon hardware). Because of the limited nature of the excavations at both sites, these differences are probably due to sampling error.

Other Artifacts Artifacts placed in this section include brick fragments; clinkers; coal; oyster shells, *Rangia* shells; slate fragments; one shoe heel; one stone marble; wood fragments; and one door knob. As can be seen in Table 10, brick fragments were collected in all excavation and depositional contexts. Most of the brick fragments were small and not conducive to further analysis. The brick fragments; wood fragments; slate pieces; and door knob represent architectural debris. The coal and clinkers may represent either domestic activities such as food production and consumption or economic activities such as blacksmithing. The oyster shell may represent a food item consumed at 16SMY66, while the *Rangia* shell is believed to be an intrusive element derived from one of several episodes of fill at the site. An adult shoe heel and the stone marble represent personal items.

Comparison of the assemblages from 16SMY66 and 16SMY132 indicate, once again, that they are almost identical. Brick and brick fragments; door knobs; slate; and wood fragments suggest that architectural elements are well represented in both samples. Similarly, clinkers and coal suggests that food preparation is represented at both sites. The presence of oyster shells in both collections may indicate dietary similarities among the plantation inhabitants (Kuttruff et al. 1993:75-80).

Analysis of Vertebrate Faunal Remains

Both domestic and wild animals are present in the collection from 16SMY66. Although the faunal assemblage is very small, it is fairly diverse. The data can be used to address issues of subsistence, butchery methods, and disposal practices. The vertebrate remains were studied using standard zooarcheological methods using the comparative skeletal collection of the Museum of Natural History, Louisiana State University. Because of the small size of the collection and the limited archeological contexts represented, all vertebrate material was grouped into a single analytical unit. A record was made of the number of identified specimens (NISP), the portion recovered, and symmetry. Evidence was noted for age, sex, and bone modifications when observed.

The Minimum Number of Individuals (MNI) was estimated based on paired elements and age. While MNI is a standard zooarcheological quantification medium, the measure has several problems. For example, MNI emphasizes small species over larger ones. This is easily demonstrated by a hypothetical sample which consists of three rabbits and one cow. While three rabbits represent a larger number of individuals, a single cow would provide a substantially greater quantity of meat. A further problem with MNI is the assumption that the entire individual was utilized at the site. From ethnographic evidence, we know this is not always the case, particularly in regard to larger individuals and for animals used for special purposes (Thomas 1971; White 1953). Additionally, MNI is influenced by the manner in which data from archeological proveniences are aggregated during analysis. The aggregation of separate samples into one analytical whole per site results in a conservative estimate of MNI, while the "maximum distinction" method, applied when analysis discerns discrete behavioral units results in a larger MNI (Grayson 1973). Further, some elements, such as pig teeth, are more readily identifiable than others, and the taxa represented by these elements may appear more significant in the species list than they were in the diet.

Several fragments of bone, including sawed pieces, were identifiable only as mammal. These fragments were assigned to the "UID Mammal" category because they could have been from a variety of domestic mammals or, for that matter, from any number of wild mammals.

In spite of the small size of the collection, biomass estimations were made to ascertain if there were differences in the usage of domestic versus wild resources. Biomass determinations attempt to compensate for problems encountered with MNI. Biomass provides information on the quantity of meat supplied by the animal. The predictions are based on the allomet-

ric principle that the proportions of body mass, skeletal mass, and skeletal dimensions change with increasing body size. This scale effect results from a need to compensate for weakness in the basic structural materials, in this case, bone. The relationship between body weight and skeletal weight is described by the allometric equation:

$$Y = aX^b$$

(Simpson et al. 1960:397). Many biological phenomena show allometry described by this formula (Gould 1966, 1971). In this equation, X is the skeletal weight, Y is the quantity of meat, b is the constant of allometry (the slope of the line), and a is the Y-intercept for a log-log plot using the method of least squares regression and the best fit line (Casteel 1978; Reitz and Cordier 1983; Reitz et al. 1987; Wing and Brown 1979). Thus, a given quantity of bone represents a predictable amount of tissue due to the effects of allometric growth. Values for a and b are obtained from calculations based on data at the Florida State Museum, University of Florida. The allometric values used are presented in Table 11.

Table 11. Allometric Values Used in this Study.

Taxa	N	Y-intercept (log a)	Slope (b)	r ²
Bone Weight (kg) to Body Weight (kg)				
Mammal	97	1.12	0.90	0.94
Turtle	26	0.51	0.67	0.55

Although biomass estimates attempt to compensate for some of the problems encountered with MNI, like MNI, they are subject to sample size bias. Casteel (1978), Grayson (1979, 1981), and Wing and Brown (1979) suggest a sample size of at least 200 individuals or 1,400 bones for a reliable interpretation. Small samples frequently will generate a short species list with undue emphasis on one species in relation to others. It is not possible to determine the nature or the extent of the bias, or correct for it, until the sample is made larger through additional work. The materials from the North Bend Bridge site represent a very limited view of the subsistence activities practiced at this site and should not be viewed as accurately representing all of the diverse activities which occurred there.

Modifications to bones can indicate butchering methods as well as site formation processes. Modifications in this collection have been classified as sawed, rodent-gnawed, and carnivore gnawed. Sawed bones are identified by multiple striations on the compact bone layer of the sawed end. Sawing would have been employed as the carcass was being dismembered. Gnawing indicates that bones were not immediately buried after disposal. While burial would not insure an absence of gnawing, exposure of bones for any length of time might result in gnawing. Gnawing by rodents and carnivores would result in loss of an unknown quantity of discarded bone.

Relative ages of the species identified were noted based on observations of the degree of epiphyseal fusion for diagnostic elements. When animals are young, their bones are not fully formed. Growth occurs between the epiphysis (end of the bone) and the diaphysis (shaft). When growth is complete the shaft and epiphysis fuse. While environmental factors influence

the actual age at which fusion is complete (Watson 1978), elements fuse in a regular temporal sequence (Gilbert 1980; Schmid 1972; Silver 1963). During analysis, bones were recorded as either fused or unfused; the bones are then placed into one of three general categories based on the age in which fusion generally occurs. This is more informative for unfused bones that fuse in the first year or so of life and for fused bones that complete growth at three or four years of age than for other bones. An element which fuses before or at eighteen months of age and is found fused archeologically could be from an animal which died immediately after fusion was complete or many years later. The ambiguity inherent in age grouping is somewhat reduced by recording each element under the oldest category possible. Attempts to age animals are particularly relevant to an historic site. Indications of an animal's age may provide data concerning animal husbandry practices such as the utilization of younger animals for food and older animals for nonfood by-products or slaughter of older animals after their usefulness as draft, wool, or dairy production is over.

Results. While the assemblage is very small (NISP=86), it is fairly diverse. The collection weighs 428.5 gm and represents an estimated five individuals (MNI=5) from five different species (Table 12). Both domesticated and wild animals were represented in the collection. Species identified in the assemblage are snapping turtle (*Chelydra serpentina*), rabbit (*Sylvilagus* spp.), pig (*Sus scrofa*), deer (*Odocoileus virginianus*), and cow (*Bos taurus*).

The snapping turtle was identified from carapace and plastron fragments. The rabbit was identified from a complete left ulna. Teeth were the most common pig remains recovered, but humerii fragments were also identified. The deer was represented by a single unfused proximal tibia epiphysis. The cow was identified from teeth, femur, and tarsal elements.

Because each species was represented by a single individual, comparisons of MNI cannot be used to address the relative importance of the species. Therefore, biomass estimations were calculated (Table 12). Not surprisingly, the cow provided most of the biomass (45 percent). This was followed by UID Mammal at almost 39 percent. The pig contributed almost 11 percent of the biomass. The deer and snapping turtle contributed 2.5 and 1.9 percent, respectively. The rabbit provided less than one percent of the biomass. It is important to note that biomass calculations are based on the elements represented in the collection rather than the entire animal.

Twenty-one percent (n=18) of the bones in the collection exhibited modifications (Table 13). Modifications to the bones were sawing, carnivore gnawing, and rodent gnawing. Sawing was the most prevalent modification in the collection. Seventy-eight percent (n=14) of the modified bones were sawed. Most of these could be identified only as mammal. Two of the cow elements which had been sawed were a right astragalus and a left calcaneus. The other sawed elements were two proximal femurs from the cow, and the distal humerii from the pig. One of the cow bones was lightly rodent-gnawed. Two of the pig bones and one of the mammal bones were carnivore-gnawed.

Age at death could be accurately estimated only for the cow and the deer. The presence of an unfused calcaneus indicates that the cow was less than three years old (Silver 1970:286). The deer was less than two years old based on the unfused proximal tibia epiphysis (Purdue 1983:1210).

Discussion. The North Bend Bridge site faunal assemblage is dominated by mammals, particularly domestic mammals. The cow was less than three years old when it was butchered. While age at death could not be estimated for the pig, the wear pattern on the identified teeth and teeth fragments indicates that the animal was fairly old, probably more than three years. The deer was likely only one year to eighteen months old. All of the animal bone appears to

Table 12. Species List.

SPECIES	NISP	MNI	Wt, gm	Biomass kg	Biomass %
<i>Chelydra serpentina</i>					
Snapping turtle	6	1	8.2	0.13	1.9
UID Mammal	48		159.4	2.63	38.9
<i>Sylvilagus</i> spp.					
Rabbit	1	1	0.8	0.02	0.3
<i>Sus scrofa</i>					
Pig	8	1	41.0	0.74	10.9
<i>Odocoileus virginianus</i>					
Deer	1	1	7.9	0.17	2.5
<i>Bos taurus</i>					
Cow	6	1	198.3	3.07	45.0
UID Vertebrate	16		10.2		
TOTAL	86	5	425.8	6.76	

Table 13. Bone Modifications.

Species	Sawed	Rodent-gnawed	Carnivore-gnawed
UID Mammal	9		
<i>Sus scrofa</i>	1		2
<i>Bos taurus</i>	4	1	1
TOTAL	14	1	3

related to subsistence rather than to other cultural practices (e.g. bone buttons, handles, etc.). More information on the subsistence activities at the site is provided by the modified bones.

Modifications to the bones in the assemblage can be used to address methods of butchery, as well as disposal patterns and taphonomy. A number of bones from the cow, the pig, and the UID Mammal category were sawed. These marks resulted from butchering the animal carcasses. Both the astragalus and calcaneus of the cow were sawed. This would have been done to remove the feet from the carcass. Other sawed bones from the cow included the femurs. Both pig humerii were sawed near the distal end of the shaft. When dividing the carcasses into different cuts of meat, these areas were sawed to produce the round and arm cuts respectively. It is likely that the deer was also butchered at the site and is represented by a number of sawed bones from the UID Mammal category. The only other modifications to the bones in the assemblage were rodent and carnivore gnawing. The relative scarcity of these modifications could point to a formal refuse discard method such as burning or burying rather than general discard.

Because of the small size of the faunal assemblage and the limited archeological contexts represented it is difficult to make any definitive statements concerning dietary practices at the North Bend Bridge site. Clearly, occupants were consuming various cuts of meat from cows and pigs. Wild resources, such as deer, rabbit, and snapping turtle were also exploited. This combination of domestic and wild resources is to be expected in a rural setting such as a quarters complex. It seems unlikely that the meats consumed at the site were purchased at a market. Home butchery of domestic and wild species appears to be a more appropriate interpretation of the current assemblage.

Additional excavations at the North Bend Bridge site will provide more data for addressing the varied subsistence activities at the site. Bone preservation is quite good, indicating that soil acidity should not adversely effect the recovery of a larger vertebrate faunal sample. By increasing sample size and studying diverse archeological contexts, we can come to a clearer understanding of the ways in which the site inhabitants procured, utilized, and discarded subsistence resources.

Conclusions

Comparisons between the artifact assemblages recovered from 16SMY66 and 16SMY132 demonstrate that they are very similar. The types and percentages of artifact classes and the functional categories that they represent are nearly identical. Since both assemblages were obtained from early-twentieth-century plantation laborer contexts living within the North Bend quarters, these results are not surprising. The most notable difference between the two collections is the presence of antebellum ceramics at 16SMY132 and their absence at 16SMY66 (Kuttruff et al. 1993:69-70, 75-80). As discussed above, this may be the result of sampling error, although the possibility of an antebellum component at 16SMY132 can not be rejected.

CHAPTER 8 RECOMMENDATIONS

Intensive pedestrian survey was undertaken for the East and West Bayou Sale Tie-in Levee, St. Mary Parish, Louisiana. The East and West Bayou Sale Tie-in Levee consists of levee enlargement and foreshore protection along the south bank of the Gulf Intracoastal Waterway (GIWW) where it crosses Bayou Sale. Survey was conducted within the limits of levee work from Sta. 0+00 (on western end) to Sta. 36+43.8 (on eastern end), from the water's edge of the (GIWW) to the outside right-of-way line. No new archeological sites or historically significant standing structures were encountered within the survey area.

In addition, National Register test excavations were conducted at the previously recorded North Bend Bridge site (16SMY66), which is located within the project area. Excavations included three backhoe trenches and four 1 x 1 m hand units. These excavations revealed the presence of intact domestic midden at the site, demonstrating that the site possesses the quality of integrity necessary for nomination to the NRHP. Cultural deposits are associated with the post-1905 occupation of the area by quarters cabins of the consolidated Stokely Vinson/North Bend Plantation.

The archeological deposits at 16SMY66 are eligible for nomination to the National Register of Historic Places under Criterion D. Criterion D states that a historical property is eligible for inclusion to the NRHP if the property "has yielded, or may be likely to yield, information important in prehistory or history" (National Park Service 1982:1). Although only a relatively small collection of artifacts was recovered, these indicate that a larger sample would have the potential to address issues concerning site chronology, the economics of the site's residents, and diet¹. It is anticipated that additional and more extensive excavations would provide data to answer these and other research questions in more detail. Specifically, data from the site may be utilized to address the themes of "Plantation Archeology" and "Euro-American Influence on the Landscape" identified in Louisiana's *Comprehensive Archeological Plan* (Smith et al. 1983:279-280). It is therefore recommended that 16SMY66 be nominated to the National Register of Historic Places.

Additional deposits from the quarters complex of Stokely Vinson/North Bend Plantation are preserved at the North Bend site (16SMY132), which is located across the GIWW and north of 16SMY66, and which was previously recommended as eligible for nomination to the National Register of Historic Places (Kuttruff 1993:101-102). As noted in Chapter 7, ceramic artifacts recovered from 16SMY132 appear to date from at least the mid-nineteenth century into the twentieth century (Kuttruff et al. 1993:Table 2), and Kuttruff et al. (1993:96-97) suggested that occupation in the area might date as early as 1830. Then too, the nineteenth-century material recovered from Excavation Unit 1 was associated with a large footing and a chain-wall foundation. While these features appear to be the remains of a post-1905 cabin that was part of the North Bend Plantation quarters complex (see Kuttruff et al., 1993:Figures 21, 28, 29, and 30), it is also possible that they may derive from an earlier structure. In addition to the association with antebellum ceramics, these features are relatively large for quarters cabins, which are generally set on very small brick footings (see Yakubik et al. 1994:5/1-5/12 for a discussion of the development of quarters housing in Louisiana; also see Kelso 1984:102-128; Michie 1990:94; Orser 1988a:135, Figure 12; Vlach 1991b:215-227). However, because no data are available on the construction of the North Bend Plantation quarters cabins, and because "additional work will be needed to clarify the precise history and origin of these sedi-

¹ See Chapter 9 for a thorough discussion of research issues.

ments in relation to the brick foundations that they enclose" (Kuttruff et al. 1993:30), this is speculative.

Because 16SMY66 and 16SMY132 are actually two areas within a single quarters complex that were artificially separated by the construction of the GIWW, it is recommended that if these sites can not be avoided during construction, that archeological data recovery be undertaken simultaneously at the two sites. A research design for data recovery at 16SMY66 and 16SMY132 follows.

CHAPTER 9

A RESEARCH DESIGN FOR ARCHEOLOGICAL DATA RECOVERY AT NORTH BEND PLANTATION, 16SMY66 AND 16SMY132

A literature review and preliminary research indicates that Louisiana sugar cane plantations are under-studied, particularly for the period after the Civil War. Some recent works have concentrated on plantation owners and their perspective (e.g. Bauer 1993; Wade 1995). Substantial research is needed in several other areas, so that interpretive issues can be considered in the light of greater basic factual knowledge. No single secondary source provides both a detailed examination of the material culture of sugar plantation life and a discussion of how this culture developed in a context of wider economic forces and dynamics within the sugar industry. Earlier attempts to achieve a synthesis of this kind (e.g. Sitterson 1953; Center For Louisiana Studies 1980) neglected various aspects of plantation culture that are of particular interest to more recent scholarly studies. Many aspects of plantation life have been approached with greater sophistication in the past decade, including specifically African-American material culture, plantation architecture and landscapes, and the interaction of technological and economic factors with material culture (e.g. Howson 1990; McKee 1992a; Orser 1992; Oszuscik 1992; McDonald 1993; Vlach 1993; Maygarden et al. 1994; Yakubik et al. 1994). However, research in plantation studies has sometimes been conducted as if plantation life was characterized by long-term stasis or developed within a vacuum, affected only by intellectual or cultural trends. A sense of the dynamism of cultural forms and the influence of economic and even natural forces has therefore sometimes been absent from historical writing, contributing to oversimplified conclusions about material culture. Research for the current project will seek a more balanced and comprehensive view of the development of material culture on Louisiana sugar plantations.

Sugar Cane in Louisiana: An Introductory Overview

Discussions of the sugarcane industry in Louisiana sometimes ignore the unique natural requirements of sugarcane growing. These requirements react with conditions in Louisiana to pose challenges to the cane grower that must be overcome for commercial agriculture to be successful. First, sugarcane is a tropical plant and naturally matures in a period longer than the Louisiana growing season. Cane is not grown from seed; rather, whole stalks are placed in a furrow in late August or early September. With modern varieties of cane, each joint of the cane stalk will normally produce from 12 to 20 new stalks for the following three years; thus, only one-quarter of a plantations acreage is usually planted in a single year. The roots of the cane which are left in the ground to produce the following year are called "ratoons." In sound practice the "plant cane" is taken from the most vigorous stand in the fields, but this has not always been followed. The sucrose in the cane plant is produced in the leaves and stored in the stalk. Being highly susceptible to damage from frost, cane is by necessity harvested while still immature. The cane harvest must be carefully calculated to allow the maximum time for ripening, yet must be completed before frost can ruin the crop. Generally speaking, the cane harvest runs from the middle of October to the middle of January, but planters usually seek to conclude harvesting by Christmas or New Year's. When the stalk is cut for harvesting, the juice within it will start to degrade within 24 hours. Thus, it is practically necessary to express the juice from the stalks within that period.

The earliest commercial plantings of sugarcane in Louisiana utilized "Creole" cane, a primitive, tough-stalked, low-producing variety. In about 1817, softer purple or ribbon cane from Martinique was introduced into Louisiana, evidently by planter Jean J. Coiron. This variety remained the mainstay of Louisiana sugar plantations throughout the nineteenth century and into the twentieth. By 1912, some planters began to note declines in productivity, and ultimately the dreaded mosaic disease was found to be the cause. However, The full impact of

the disease was not felt for over a decade. Sugar prices were very high during and after World War I, and some farmers ground their best cane and utilized lesser quality cane for planting, a short-sighted practice. Droughts combined with the full effect of mosaic disease caused sugar production to plummet from 290,000 tons in 1922 to 88,000 in 1924, and even lower to 47,000 tons in 1926. After these blows, the 1927 Mississippi River flood and the Great Depression spelled doom for many cane planters. Much reorganization of the cane industry occurred. Mosaic-resistant P.O.J. cane from Java by way of Argentina was introduced before 1920. This superior variety finally replaced the old ribbon cane, and sugarcane agriculture in Louisiana was saved (American Sugar Cane League 1939:5; Butler 1980:12).

The Louisiana cane industry, producing almost entirely for a domestic market, developed along with a voracious appetite for sugar on the part of the American public. Total American consumption of sugar was slightly over half a million tons in 1860. This had doubled by 1880, reached 2.5 million tons by 1900, and stood at 7 million tons in 1929. Per capita consumption of sugar in the United States also rose in this period, from 30 pounds in 1860 to 107 pounds in 1929. At the same time, the grade of sugar preferred by American tastes became more important to producers. Prior to the Civil War, American growers supplied 30% of domestic consumption, of which 80% was raw brown sugar. By 1915, only 4% of American consumption was "plantation grade" raw sugar (Schmitz 1979:280), placing a premium on the better-grade production of technologically advanced sugar houses.

Since the 1840s, it has been recognized that in Louisiana sugarcane requires tariff protection to compete with the product of tropical regions. U.S. import tariffs imposed in 1842 were a huge boost to the profitability of sugar cane plantations. There followed a quick rise in the size and number of cane plantations in Louisiana, and rapid investment in industrial processing technologies, namely the steam cane mill and vacuum pan (discussed in more detail below) (Maygarden et al. 1994). In 1846, the 1842 tariff was replaced with a 30% *ad valorem* tariff on raw and refined sugar, which remained in effect until 1861. Various tariff rates were put in place by the United States government during the Civil War (Schmitz 1979:271-274) while the Louisiana plantations were seriously affected by the conflict. Sugar houses were damaged or destroyed, livestock confiscated or killed, seedcane stocks depleted, levees damaged. Emancipation disrupted the organization of plantation labor and liquidated enormous amounts of capital. Thus, in the immediate post-Civil War period the sugar industry was in poor shape. Per capita production of sugar in the United States in 1870 was only one-quarter what it had been in 1850, while Louisiana in 1870 produced only 36% of its 1850 production (Quaintance 1904:11, 14). In 1870, the tariff on raw sugar was placed at 2.25 cents per pound and at 4 cents per pound for refined sugar. In 1875, these tariffs were raised, but in 1883, they were reduced to nearly the 1870 levels. Sugar-growing had rebounded, per capita production increasing by nearly 100% between 1870 and 1900, during a period of rapid overall population growth (Quaintance 1904:11, 14, 25-26). Louisiana had exceeded its annual antebellum cane production total by 1890, producing almost 300,000,000 pounds of cane (McGinty 1935:424).

In 1890, the McKinley Tariff removed the tariff on raw sugar, and on refined sugar the tariff was lowered to .5 cents per pound; a bounty of 2 cents per pound was paid to domestic raw sugar producers and a higher bounty to domestic refined sugar manufacturers. In 1894, the bounties were replaced with a 40% *ad valorem* tariff on raw and refined sugar. Three years later, tariffs were set at 1.685 cents per pound for raw sugar and 1.95 cents per pound for refined. Tariffs remained in about this proportion into the 1930s, although the actual rates were lowered in 1913 in response to public displeasure over the Sugar Trust. Tariffs were raised again in 1921. In 1930, before the production regulations imposed during the Great Depression, the tariff on raw sugar stood at 2.5 cents per pound and on refined sugar at 2.65 cents per pound. The political motivations behind these arrangements were sometimes complicated, and there were special arrangements for particular territories and countries, such as

Hawaii, Cuba, Puerto Rico, and the Philippines. Cuba was the major competitive producer of sugar for the U.S. market, alone producing over 40% of the sugar consumed in the U.S. between 1880 and 1895, and then again from 1906 to 1930. In the period from 1900 to 1930, the percentage of U.S. sugar consumption supplied by domestic cane growers sank from about 12% to less than 2% (Schmitz 1979:281-284).

Technological Developments in Cane Cultivation: 1840-1940

During the second half of the nineteenth century, agriculture in the United States experienced a technological revolution. Between 1850 and 1860, the monetary value of agricultural implements in the United States increased by 300%; between 1850 and 1900, by 1500%. During this period of exponential growth in the investment in machinery, the relative prices of farm machines were declining overall; later machines were more efficient, more durable, and more readily operated than earlier mechanized implements (Quaintance 1904:11). The Louisiana planters of sugar cane were affected by this general trend, although less so than large-scale growers of wheat and corn.

Technological advances played a major part in this resuscitation of the sugar cane industry after the Civil War. Between 1860 and the mid-1890s, mechanization nearly halved the labor requirements of cane growing, and the costs of labor by over one-third (Slichen Van Bath 1960:18). Overall, the cost of producing sugar cane decreased by about 50% between 1855 and 1890. This dramatic reduction in the cost of producing cane was not totally due to new technologies. However, it matched the decrease in the cost of producing corn, one of the crops heavily mechanized by the 1890s, and was significantly greater than the median decrease in the cost of production for all major U.S. crops. By the end of the 1890s, mechanization saved some \$5.25 million per year over what it would have cost to produce the U.S. sugar crop by antebellum methods (Quaintance 1904:11, 14, 25-26).

In the second half of the nineteenth century, all aspects of sugarcane culture were affected by technological development, with the exception of cutting the cane for harvest. Technological advances allowed marginal lands to be brought into cane production in the post-Civil War period. Cane fields have to be properly drained and require extensive ditching. Until the introduction of dry-land excavators, ditches were excavated by hand with shovels. Once dug, the ditches also needed frequent cleaning; on a 1000-acre plantation, two men were kept busy cleaning (or "plugging") ditches year-round except for the harvest season. The first of these dry-land excavators were animal-drawn drag scrapers, followed by two- and four-wheel scrapers. Even these animal-drawn implements greatly reduced the manual labor involved in excavating and maintaining ditches. The necessity of ditching with manual labor or the early dry-land excavators limited the growing of cane to easily-drained, lighter soils along watercourses. Steam shovels and steam-powered drainage pumps were adapted to plantation drainage work during the early 1880s (Wilkinson 1890:65). Steam-powered draglines, similar to steam shovels but drawing a bucket scraper along the line of the ditch, were not introduced until the World War I era. By the early 1920s, they had become the most generally-used means of excavating plantation ditches (Pickels 1925:385; Maier 1952) and had eliminated much of the remaining hand labor involved in managing cane field drainage.

Prior to 1865, the cultivation of sugarcane was also performed almost entirely by hand labor. Plowing was performed by small plows drawn by one or two mules, and all other cultivation was performed by hand hoes and shovels. Hoes had early on settled into two basic shapes: the short-handled hoe for "grubbing" stubble with a blade 3-4 inches wide, and the long-handled weeding hoe with a blade 5-8 inches wide. These two patterns of hoe remained in use into the twentieth century (Maier 1952:7). As noted above, early-ripening ribbon cane was introduced in Louisiana in 1817 (Wik 1953:6), and with purple cane varieties, superseded the old Creole cane during the 1830s. After a period of experimentation, it was found opti-

mum to plant in rows about 5 or 6 feet apart, twice as wide as with the old cane variety. This allowed the use of two-mule plows, resulting in deeper cultivation and better weed control. The wider rows also allowed more-efficient four-mule carts ("Bang Bellies") to replace three-mule cane carts for carrying the cut cane to the mill (Maier 1952:7-8).

Technological change greatly accelerated after the Civil War. Among the first truly specialized implements for cane cultivation was the mule-drawn cane shaver or scraper, introduced about 1870, which replaced the time-consuming work of many men shaving stubble. The decade from 1883 to 1893 saw the introduction of many important implements for cane cultivation which remained in use well into the twentieth century. These included the Advance or double-moldboard plow, the stubble digger, and various types of improved harrows: rotary, spring tooth, side, and "A" frame. The double-mouldboard plow performed in one operation what formerly required two passes with a turn plow. The left hand plow used to cover seed cane was also introduced in this period, and subsoil plows came into limited use (Maier 1952:8-9). Turn plows had begun to become larger in the antebellum period as the benefits of subsoil plowing became known (Thomas 1854:134), but did not come into common use in the cane fields until the post-Civil War period. Drawn by four mules, the larger turning plows made possible the plowing of the heavy soils first coming into cultivation for cane growing at this time. The plow with a four-mule hitch required two persons to operate; usually an adolescent boy driving the mules and riding the left rear animal, with a man walking behind and guiding the plow (Maier 1952:8-9, 11). Substitution of plowing for hoe cultivation decreased labor requirements from one hand per every 7-8 acres of cane to one hand for every 15 acres. By the 1880s, the cane crop was cultivated almost entirely by the turning plow (Sitterson 1953:278).

Perhaps the single most important technological innovation in cane culture during this period was the Mallon rotary hoe, introduced by James Mallon before 1890. This revolutionary device consisted of a number of paddles radiating about an axis in a fan-shaped arrangement, to work on both sides of the cane row. It was designed to replace "cross-hauling" or building up the rows of cane by the hand labor of hoe gangs. The Mallon cultivator reduced the labor requirement for cultivating cane fields even further, to one hand per 25 or 30 acres. By 1905, 90% of cane acreage in Louisiana was cultivated with the mechanical row cultivator (Sitterson 1953:278). Other innovations appearing at the end of this period were the disc cultivator, disc harrow, and the drag bar (forerunner of the walking cultivator) (Maier 1952:8-9, 11).

In the period from 1893 to 1910, the rate of innovation in cane-cultivating implements slowed, but many refinements were made to existing devices. The rotary pick harrow was introduced in this period, as was the multi-use Magnolia implement. The Magnolia was a wheeled frame with a central shaft on two wheels, drawn by four mules. Its axles could be narrowed or extended to pass between the cane rows or straddle them, and rolling coulters, scrapers, knife shavers, right-and left-hand plows (or "rainbow plows"), and other implements could be attached. The Magnolia was operated by a single worker seated at the rear, who also drove the mules (Maier 1952:9-10).

In 1915, mechanical cane loaders were introduced in Louisiana, and by 1940 had become common on cane plantations (Burrows and Shlomowitz 1992:69). These loaders were essentially a rotating crane fitted with large pincers, powered by a small steam engine. They were mounted on wagons and drawn by mules. A mechanical loader could handle 500 tons of cane in a working day (American Sugar Cane League 1939), all of which formerly would have been loaded onto wagons or rail cars by human loaders, who received higher pay for this particularly taxing work. Mechanical cane loaders further reduced labor requirements during harvest, the time of peak demand for workers.

Perhaps the most important technological development in cane agriculture between 1910 and 1940 was what might be called the "tractor revolution." From the early-antebellum period (when oxen fell from popularity) until the early-twentieth century, nearly all tractive power on the cane plantations was supplied by mules. The mules were a major factor in the efficiency and productivity of a plantation and were well-suited to southern plantation work. Contrary to popular belief, mules are not less susceptible to heat than are horses. Rather, a mule will stop pulling before becoming overheated, and in several other respects is able to function with less attention and care (and therefore expense) than horses require. The mules used in the early-antebellum period, while only lighter soils were being plowed, were lighter animals. Over time, larger, heavier mules were favored as more efficient on lighter soils and necessary on the heavier soils being brought into cultivation. Most of these heavy mules were specially bred in Kentucky and Tennessee. The number of mules in use on cane plantations grew until the 1930s, when they began to decline in competition with tractors (Maier 1952:11; Slichen Van Bath 1960:7)

Efforts prior to the Civil War to make practical steam traction engines for plowing were unsuccessful. By the 1890s, advances in plowing engines had been achieved, but they were still extremely expensive and heavy. All of the metal-tired steam tractors had difficulty in soft ground (Wik 1953:61-63, 94-95). Thus, they were of very limited utility for cane agriculture, and only a few (if any) of the steam tractors were ever used for plowing in the sugar cane region (Maier 1952:11). Likewise, self-propelled steam implements were not developed for other aspects of cane field use because of the distinctive nature of cane growing and harvesting.

By 1916, a few tracked tractors with internal combustion engines were in use in Louisiana for pulling plows, since they gave a greater horsepower pull at the drawbar with far less pressure per square inch on the land than the earlier wheeled tractors. In 1917, the heavy Thomson single row cane plow was introduced, and tracked tractors were used to pull them. Various drawbacks limited the adoption of these tracked tractors. Their low ground clearance allowed them to be used for plowing but not for cultivation. The hitching of implements behind these tractors required two-man operation, one to drive the tractor and one to operate the implement. Large turning radiuses were required, producing badly-cultivated row-ends and mashed cane. The Moline Universal tractor solved some of these problems and was operated by a single person. However, it could not be used for cultivation on heavier soils because of a lack of power. All of the tractors tried before 1928 were in some measure unsatisfactory. Planters were reluctant to invest in expensive machinery that had only limited utility, and mules remained the mainstay of sugar plantation tractive power (Maier 1952:11-13).

Between 1928 and 1931, the major drawbacks of tractors for cane cultivation were solved. In the former year, B.C. Thompson adjusted the tread width on a high-speed, high-clearance rear-wheel drive tractor to fit a six-foot wide cane row, and attached a lifting device so that tractor-drawn implements might be raised clear of the ground when not in use. In 1931, rubber-tired wheels were first fitted to tractors and cane wagons, replacing the all-steel wheels in use up to that time. The problems associated with using steel wheels in the cane fields were largely solved. By World War II, a common calculation of the power required on a sugar plantation was one tractor and four mules for every 250 acres in cultivation. One standard size (or large) tractor was regarded as equivalent to 14 mules, a medium tractor to 11 mules, and a small tractor, 6 or 7 mules. Thus, a 1000-acre sugar plantation may have required about 72 mules prior to the introduction of effective tractors, and could replace them all with five or six tractors. An additional benefit of conversion to tractors was that the extensive acreage devoted to growing corn and hay for mule fodder on the plantation could be switched to cane. By 1950, many plantations had converted to all-tractor cultivation (Maier 1952:13).

The cutting of sugarcane for harvest was one area of cane agriculture that was affected by technology at a later date than cultivation. The difficulty of designing a mechanism that could replace the human cane-cutter stymied efforts to develop a satisfactory harvesting machine for decades. The cane cutter, wielding a broad-bladed steel cane knife, performed several operations. Grasping the cane stalk from the top to bend it over, the cutter stripped the stalk of leaves, trimmed off its unripe joints, lopped the top, and severed the stalk from the roots. The cane was then laid on the ground for other workers to collect in the cane carts for conveyance to the mill.

Early efforts to develop cane-harvesting machines were hampered by the unavailability of engines powerful and light enough to be used in the fields. The mule-drawn Gonserand Cane Cutter was used to a limited extent in the early-twentieth century, and the Luce Cane Harvester was introduced in the early-1920s. However, cane harvesters were not fully satisfactory until the modern era in cane harvesting began with the introduction of the Munson-Thomson Cane Harvester in 1938. During the late 1930s, it had become very difficult to find enough workers to harvest cane. If cold weather necessitated windrowing the cane and a consequent increase of harvesting time per worker, it was impossible to find enough workers. The acute shortage of labor prompted the development of the harvester from a machine originally designed to windrow the cane (Maier 1952:38-40). By 1940, 63% of the cane crop was cut by these mechanical harvesters (Burrows and Shlomowitz 1992:69).

The impact of mechanization upon labor requirements for sugarcane cultivation between the antebellum period and World War II was very great. By the mid-1890s, a well-capitalized plantation could replace large hoe gangs with the new mule-drawn implements developed for sugarcane culture. Cane-growing remained more labor-intensive than many crops, and cane harvesting remained particularly dependent on a seasonal labor force. During the early 1920s, the tasks of harvesting, transporting, and covering one acre of seed cane, if planted in the fall, required 11.21 man-days of labor. If planted in the spring, harvesting, windrowing, removing from storage, and planting accounted for 15.67 labor days. Cultivation accounted for 12.04 more days, fertilization at least half a day, and harvesting 10.97 days. Thus each acre of cane demanded from 34 to 39 days of man labor and 20 to 23 days of mule labor per year. A large plantation, say of 2000 to 5000 acres in cane, would require a year-round work force of at least 100 to 150 wage hands. At least three or four times that many would be required in the combination season of planting and harvesting, and even a force of workers this size was not completely satisfactory (Vance 1932:221-222).

By 1930, each tractor in use, driven by a single worker, replaced at least three two-man, four-mule teams for plowing and three one-man, four-mule teams for cultivation. Thus, labor requirements for cane-growing, dramatically reduced in the late nineteenth century, were dramatically reduced again by at least one-third during the 1930s. Finally, innovations in cane harvesting machinery at the end of the 1930s meant much of the seasonal labor required for cutting cane could be replaced with machines.

The interplay of technological developments with the lifestyle of the plantation worker is a complex issue. On a basic level, mechanization generally reduced the amount of physical exertion required of agricultural labor (Quaintance 1904:74). Comparison of driving a riding cultivator versus cultivating rows with a hoe; operation of a gasoline-powered tractor versus guiding a mule-drawn plow; and riding a cane harvester versus cutting cane with a cane knife, should make this point patently obvious. However, the physical work limits of animals and men were superseded by theoretically tireless machines, and a relative perspective should be maintained on how arduous levels of work were in any period. Changes in the technological context of labor also had significant repercussions in other ways, including effects on wages, distribution of labor by gender, and other aspects of plantation life, which are discussed in greater detail below.

Advances in Cane Processing in the Antebellum Period

The sugar mill held a particularly important place on the sugar plantation. Raw sugarcane had little value in itself, because the juice rapidly degraded in the stalk after cutting and reduced the value of the crop. It was best to grind the cane immediately after cutting. Because in Louisiana's climate it was necessary to let cane ripen until the last practical moment, there was consequently a rush to harvest and grind the cane before cold temperatures damaged it (Wik 1953:6). This central fact of how a marketable product was produced from sugarcane was of paramount importance in the momentum towards economies of scale in cane production. Cane mills were run night and day during harvest season to handle the quantities of cane, and the application of steam power to the machinery was an obvious step. Steam-powered cane mills appeared in Louisiana not later than 1818; apparently the first planter to use a steam-driven mill was Jean J. Coiron, who also brought ribbon cane to Louisiana. Coiron reportedly paid \$12,000 for his steam engine and mill. Despite the cost, at least ten steam engines were driving Louisiana cane mills within five years. Many of these first engines were made by Fawcett & Company in Liverpool, England, were of the low-pressure condensing type, and had an average output of sixteen horsepower. These English mills cost approximately \$7,000 apiece (Wik 1953:6-7). Within a decade about 120 steam-driven cane mills were in operation in Louisiana; between 1828 and 1831 the number of steam-powered mills in use in Louisiana nearly doubled (Butler 1980:12; Maygarden et al. 1994:3-12).

The adoption of new technologies was the hallmark of the large planters, who could afford to be more forward-thinking than smaller planters. By 1831, three-quarters of the cane grown in the Louisiana was ground by steam mills on the larger estates. The expensive imported equipment soon had domestic competitors. The price of a steam mill fell to about \$4500 by the early 1830s, and American producers like W. Tift & Co. of Cincinnati, the West Point Foundry of New York, Holmes Hinckley of Boston, John Allaire of New York, the Niles Co. of Cincinnati, the Leeds Foundry of New Orleans (established in 1825), and the Tredegar Iron Works of Richmond, Virginia, rose to prominence. By the early 1840s, steam engines were powering well over half of the sugar mills in Louisiana; in 1844, 408 of 762 sugar houses in the state were using steam mills. Although the proportion of steam to horse-powered mills changed little in the 1840s, the total number of mills doubled in the second half of the decade. By 1850, there were 865 steam sugar mills and 681 horse-powered mills in Louisiana. The large sugar plantations retained predominance in production, and in 1850, some 200 Louisiana estates produced one-half of the sugar grown in the United States. Mechanization proceeded in the 1850s, and by the eve of the Civil War, over three-quarters of the sugar mills in the United States were using steam mills. Fairly standard sugar house equipment by the later antebellum period was the three-roller horizontal roller mill driven by a Corliss steam engine, producing around 22 horsepower (Wik 1953:6-7; Schmitz 1979; Butler 1980:12; Maygarden et al. 1994).

The processing of sugarcane required more than milling, since the final market product was not raw cane juice but crystallized sugar. The evaporation, purification, and crystallization of cane juice had been systematized in the Caribbean in the eighteenth century. The cane juice was boiled in a series of large open kettles, frequently referred to as a "Jamaica train," until it crystallized in the last and smallest kettle. Open kettles were a very erratic means of producing crystallized sugar, with a constant danger of inversion of the sugar from overheating. Only dark brown crystallized sugar, of about 88% sucrose content, could be produced by the open kettle method. In 1813, the Englishman Edward Howard developed the technique of boiling sugarcane juice in a vacuum, at a lower temperature than in the open-pan method. Howard developed a spherical steam-heated vacuum pan, allowing a much more-controlled means of boiling the cane juice to the point of crystallization. Howard's revolutionary apparatus was soon followed by the similar vacuum pan of Derosne and Cail. In 1843, Norbert

Rillieux (a Louisiana Free Person of Color) developed his superior "double effect" vacuum pan apparatus. By 1846, approximately 30 Louisiana sugar plantations had adopted one or more form of vacuum apparatus, the great majority the Howard pan. By the 1850s, vacuum pans were being adopted at a slower rate than in the 1840s. In 1859, there were 13 of the superior Rillieux systems in use, 27 other types of vacuum pan, and 23 sugar houses using open steam-heated pans (or "steam trains"). By 1861, the plantations using vacuum pans turned out the majority of the unrefined crystallized sugar produced in Louisiana (Schmitz 1979:274; Maygarden et al. 1994).

The great expense of steam mills and vacuum pans, combined with the inherent risk of trying to grow a tropical crop in a subtropical climate, meant that modernization was a game open only to big planters with access to a lot of capital. Sugar prices were consistently high in the first half of the 1840s, and the strongly protective U.S. tariff bill of 1842 placed planters who had invested heavily in capital improvements in a strong competitive position when the tariff was modified in 1846. In 1850, a complete steam engine and mill might cost \$12,500, and a vacuum pan \$6,500. A complete modern sugar house, with steam boilers, mill, evaporators and clarifiers, vacuum pan, and other appurtenances, could cost up to \$100,000 by the late 1850s (Maygarden et al. 1994). The majority of Louisiana sugar houses did not have vacuum pans, yet the average value of the machinery in Louisiana sugar houses in the late antebellum period was \$12,000 (Schmitz 1979:274). The higher value of the largest sugar estates provided collateral for further borrowing and expenditure on modernizations, expansion of plantation acreage, or the purchase of slaves. By the last decade of the antebellum period, the value of individual sugar plantations -- with capital investments in land, slaves, livestock, and sugar machinery -- had soared. In 1852, Valcour Aime's 15,000 acres of sugar cane estates were valued at \$700,000 (Wik 1953:7).

The Rise of the Central Factory System

The Civil War played havoc with the sugar plantations. Despite the unsettled state of labor organization in the post-War period, the destruction or damage of sugar house machinery, and loss of plantation livestock and implements, many of the cane plantations eventually recovered, even if with new owners. Many plantations were lost by their antebellum proprietors in tax sales or mortgage defaults, or subdivided. Other estates were purchased by well-capitalized northerners. Technological advances in cultivation practices -- in drainage machinery, subsoil plows, and other implements -- meant lands formerly considered marginal for cane growing could be put into production. In addition, land costs in the sugar region were lower than prewar levels. In St. Mary Parish, some alluvial lands could be purchased for less than one-half of their antebellum value per acre (Harris 1881:118). The ability to plant more extensively on old cane tracts, plus the much lower land costs after the war, meant that some plantations produced significantly more cane than before the war and began to grow in size.

As plantation acreage grew after the Civil War, sugar houses also grew larger to grind increasing quantities of cane in the time available for harvest. There was already a trend by the early 1880s for large sugar houses to draw cane not only from their own plantations but also from surrounding small farmers. This was true in the leading sugar parishes, including St. Mary Parish (Harris 1881:217). However, the extent of field acreage that could be handled by a single sugar house was limited partly by difficulties in getting the cane to the sugar house quickly enough, particularly in wet weather. As early as 1833, a few Louisiana planters began to utilize mule-drawn trams on portable tracks to speed up the hauling of cane from the fields to the sugar house. However, the improvement was marginal and not dramatic, since the strength of mules was limited, and it is not known how widespread this practice became. Steam locomotives, the logical next step after mule-drawn trams, seem not to have been utilized on plantation railways until the late 1880s, but the adoption of plantation railways was very rapid after 1890. These railways contributed to the rise of the central factory system by

allowing a single sugar house to serve thousands instead of hundreds of acres of canefields. The growth in the number of sugar houses stopped. Instead, central factories continued to grow larger and more efficient, and money was invested in extensive rail systems to supply them with cane. Planters consolidated larger cane acreages on individual plantations principally because transportation of cut cane by rail allowed economies of scale to operate (Butler 1980:21-25). Between 1880 and 1900, individual plantations grew in size while the total acreage of cane grown in Louisiana increased by 60% (Quaintance 1904:13).

By 1900, most central factory sugar houses had a rail system with two locomotives. Some plantations had five or six, and at the extreme upper end of the spectrum, up to 15 locomotives. The locomotives used on the sugarcane plantations were mostly built by the Baldwin, Cooke, Davenport, Dickson, Porter, and Vulcan Locomotive works. The locomotives varied between 8 and 26 tons in weight, although most were in the 12-15 ton range. In 1910, a 10-ton locomotive cost an average of \$2,500, delivered. Nearly all were narrow gauge railways; about three-quarters had tracks 36" wide. Each four-ton narrow gauge railway car carried as much cane as two four-mule carts or four one-mule tramway cars, further reducing labor and livestock requirements (Butler 1980:21-25). The multiple locomotives and extensive track networks for plantation railways serving the largest sugar houses could cost over \$200,000 (Schmitz 1979:275).

After the introduction of plantation steam railways in the late 1880s, there was a precipitous decline in the number of sugar houses in Louisiana. There were 905 sugar mills in Louisiana in 1887, 745 (82%) of them steam-powered, and 160 (18%) of them horse-powered. Between 1887 and 1900 nearly two-thirds of the sugar mills in Louisiana ceased to operate; only 307 mills remained in the state in 1900, all but three of them steam-powered. The trend continued in the twentieth century. In 1910, there were 200 mills operating in Louisiana, and by 1922, only 112 sugar houses remained in use. Four years later, during the height of the mosaic disease crisis, only 54 mills operated in Louisiana. Contrary to a widely held view that the number of sugar houses in Louisiana declined steadily after 1900, the revival of cane-growing following the introduction of P.O.J. cane caused the reactivation of a number of sugar houses; in 1930, 70 mills were in use in Louisiana, and by 1939, the number of active mills had increased to 72 (Louisiana Sugar Cane Association 1939: Schmitz 1979:274; Butler 1980:12-14).

The ability to deliver increasing amounts of cane to the mill quickly on the plantation railroads reinforced a number of trends in sugar house technology. Mechanized sugar houses became industrial central factories utilizing improved versions of machines developed in the antebellum period. All steps of cane processing were developed to produce more and better sugar. The introduction of macerators, pressure regulators, tandem units, and other features significantly improved the efficiency of milling. Whereas the antebellum mills were lucky to express 60% of the sugar content from the stalks (50% was more usual), by 1910 the Louisiana mills were extracting about 76% of the sucrose from the cane. Producing the maximum amount of sucrose per ton of ground cane in Louisiana was important in competing with tropically-grown cane, which had a higher sucrose content. The open steam-heated evaporators and clarifiers developed before the Civil War were improved, filter systems were modernized, and most importantly, newer and even better versions of the multiple-effect Rillieux vacuum pans became standard. The large Rillieux triple- and quadruple-effect vacuum-pans produced better-grade sugar more efficiently than competing systems, and were manufactured by numerous companies, including the prominent firm of Edwards and Hauptman in New Orleans (Maygarden et al. 1994).

The crystallized sugar from the vacuum pans, mixed with molasses, was treated further before either sale as brown sugar or final chemical refining into white sugar. The chunks of cooled, crystallized sugar and molasses were broken up in mechanical mixers and then placed

in centrifugal machines that removed the molasses. Both mixers and centrifugals had been introduced prior to the Civil War in the largest sugar houses. They were improved in capacity and efficiency and became necessary items in the central factories. The brown sugar from the centrifugals was the major consumer product of the Louisiana sugar plantations well into the twentieth century. As late as 1912, only about 28% of total Louisiana sugar production was sent to New Orleans or eastern seaboard cities for refining. By 1917, white sugar made up 46% of Louisiana's total production, but in 1929, the majority of Louisiana sugar production was still consumed as unrefined brown sugar (Schmitz 1979:274-275; Maygarden et al. 1994).

By the first decade of the twentieth century, the average capital stock of each of Louisiana's sugar factories was \$170,000, indicating how capital-intensive the sugar industry in Louisiana had become. Several of the central factories had become very large, and were appointed with all of the latest technology for cane processing. The largest of the early-twentieth century sugar factories was the Reserve sugar house of the Louisiana Sugar Company. In 1907, the sugar house was valued at \$136,192, and its machinery at \$547,181. At least four other factories-- Elm Hall, Raceland, Adeline, and Sterling-- each had buildings and equipment valued at over \$500,000. The large capital outlay required to build, maintain, and modernize a central factory reinforced a trend toward cooperative or private corporation ownership of sugar factories, and in some cases of the principal plantations supplying the mills. The Reserve plantation, including its railroad, had total assets of \$1,700,000 (Schmitz 1979:275).

The central factories and the plantation railroads provided new opportunities for small, independent cane farmers and for cane-growing tenants (discussed in greater detail below). By 1916, the average sugar factory was grinding over 25,000 tons of cane in a season, the output of about 1,700 acres under normal yields. It was difficult for a single firm to efficiently organize this much acreage. By 1916, the majority of tonnage ground at Louisiana cane factories was purchased by the mills, and 85% of Louisiana sugar factories purchased at least some of the cane they ground. Typically, the larger the factory, the greater reliance on outside sources of cane. Only nine of the over 150 mills in Louisiana in 1916 purchased all of their cane. The trend was for the factories to purchase more cane as time went on and rely less on the production of their own plantations. By 1923, the Billaud Sugar Factory was the largest mill in the state and purchased all of its cane from 762 individual cane farmers within a 20-mile radius. Another large factory, at Alma Plantation, bought cane from 500 growers, served by its own 13-mile railroad and by the regular Gulf-Coast Line (Schmitz 1979:276-277).

It is clear that the Louisiana sugar industry's major competition consisted of the tropical sugarcane-growing countries (Schmitz 1979:283-285). Heitman's (1987) emphasis on the threat of European beet sugar to the Louisiana cane industry may reflect a certain viewpoint among Louisiana planters, but this perspective seems misplaced. The Louisiana planter was competing first and foremost against the Cubans and other tropical producers, and he knew it. Technological developments were embraced if they offered cost-effective improvements in productivity and efficiency. The scientific research sponsored by the Louisiana Sugar Planter's Association in the last decades of the nineteenth century was an important and profitable endeavor, and probably contributed to the increase in productivity on Louisiana cane plantations during this period. In 1880, the average acre of Louisiana sugar cane produced approximately 1,700 pounds of raw sugar. By 1910, this yield had increased to 2,200 pounds of raw sugar per acre. This 23% increase in the yield of Louisiana cane acreage was likely the result of a combination of improvements in cultivation and processing of cane, made possible by the willingness of planters to try new equipment and methods. Heitman (1987) seems correct in his assessment that the enthusiasm for scientific research on the part of the Louisiana cane interests was not sustained into the twentieth century. Between 1909 and 1931, there was no change in the average yield of sugar per ton of cane ground, and even a decrease in the overall productivity of cane acreage to 2,100 pounds of cane per acre (Schmitz 1979:276). These statistics indicate that after the first decade of the twentieth century, the Louisiana cane grow-

ers could not count on increases in productivity to ensure profits, which was a distinctive change from the preceding thirty years.

Labor on Sugarcane Plantations in the Antebellum Period

The literature on slavery in the American south has proceeded from important early surveys (e.g. Stamp 1956, Genovese 1976) to burgeon in recent decades. More sophisticated interpretation of African-American slave culture (e.g., Malone 1985; Stuckey 1987; Epperson 1990; Faust 1991; Yakubik et al. 1994), and, more generally, plantation material culture (e.g. Lewis 1985; Howson 1990; Orser 1992; McDonald 1993; Maygarden et al. 1994) are available now than was the case a generation ago. However, surprisingly little of this body of work has concentrated on sugar plantations and drawn conclusions recognizing the unique features of these plantations, relative to other parts of the slave-holding south.

One important aspect of sugarcane plantations was, of course, the way labor was organized in cane culture. The distinctions between labor in cane agriculture and cotton agriculture have not been thoroughly explored by scholars. Slave labor was usually organized in either the gang system or the task system. Many plantations actually utilized both, depending upon the work required. This generalization says little about the complexity of labor organization on the cane plantations. The autonomy of the field hand laboring under the gang system on the sugar plantation was very low, and gang labor was among the most resented aspects of slavery in the cane region (Nordhoff 1876). In contrast to the cotton plantations, the sugar plantations sought to impose a factory-like discipline on workers, but could not escape the influence of natural conditions of agriculture and the cultural predispositions of their workforce (Genovese 1976:291).

Obviously, not all slaves were equally adept at the wide variety of tasks required on a cane-growing plantation, and there was a degree of specialization of workers in cane agriculture. Some of the labor specializations recognized among male slaves on the cane plantations were domestic servant, driver, plough hand, carter, stockman, woodcutter, or ditcher, as well as occupational designations such as carpenter, cooper, blacksmith, and even sugar house engineer. Women could be specialized as washwomen, cooks, seamstresses, nurses, or other occupations. Both sexes could be simply designated as "field hands." The implications of these occupational specializations for relative slave status has not been considered in any detail in the scholarly literature, beyond the house servant-field hand distinction. However, it is possible if not likely that occupational specialization among slaves on the sugar plantations had status connotations reflected in housing, access to consumer goods, and other aspects of slave life reflected in material culture.

Among the unique features of the sugar cane plantations was the hectic pace of activity during the grinding season. The anxiety of the planter over the quality and size of the crop produced tension and excitement on the plantation. Cane was harvested from sunup to sundown, seven days a week by virtually all hands not involved in the operation of the sugar house, even by those normally exempted from field labor. Interestingly, antebellum commentators insist that the grinding season was a time of high spirits among the plantation slaves, even festivity, despite exhaustion from the strenuous work. This jocularity was usually ascribed to heightened social excitement, the greater quantity and quality of food and beverage allowances, and sometimes, the paying of cash bounties by the planter for the harvest and processing of a good crop (Maygarden et al. 1994).

Generally speaking, bondage on the cane plantations of Louisiana had a reputation as worse relative to slavery in the upper south. Work was hard, sickness more frequent, but in the late antebellum period, the material welfare of slaves on the great sugar estates was probably higher than elsewhere (Genovese 1976:53; c.f. Yakubik et al. 1994). Then too, there was

a huge demand for slaves in the region as the sugar plantations expanded production during the antebellum period. A standard calculation of labor requirements in the 1850s was one hand per 9 or 10 acres of cane, while planters almost always had significantly more total slaves than they did field hands (Stampp 1956). While a planter with 500 acres in cane would need about 55 regular field hands to cultivate his cane, he would typically require about 200 to harvest the cane (Vance 1932:221-222). The slave population of Louisiana increased by over 50% between 1830 and 1840, to 193,954; by 1860, the slave population of the state was almost double the 1840 total (Goins and Caldwell 1995:55). Despite this exponential growth of the slave population in Louisiana, many planters were required to hire hands at harvest from other planters. Some planters had a tendency to overwork these hired hands, as well as their own workers (Nordhoff 1876:56; Stampp 1956:82-84).

Labor on the Sugar Plantations after Emancipation

Labor on sugarcane plantations had to be reorganized after Emancipation. Despite technological advances in cane cultivation, growing and harvesting cane remained relatively labor-intensive. For this and other reasons, production of cane by small, independent growers presented difficulties at a commercial level after the Civil War just as it did before. Given the handicaps under which sugar cane is grown in Louisiana, the pressure toward economies of scale in production was persistent. The Civil War was not a revolution in land-ownership in the sugar region, and planters believed, correctly or not, that it was more profitable to grow sugar on a large, centrally-directed plantation than by other methods (see below). When studying the history of Louisiana sugar, it does as little good to regret a counterfactual small-planter-dominated sugar industry as it does to be distracted by moonlight-and-magnolias plantation nostalgia.

A central fact is that plantation owners preferred centrally-directed wage labor to other options once emancipation was an accepted fact, and planters recurrently complained about shortages of labor from the Civil War to World War II. A view of the context of agricultural labor in Louisiana is required to gain an understanding of how the organization of labor on cane plantations developed in the post-Civil War era, and how shortages of cane labor affected both the sugar industry and the workers themselves.

Census figures for the South Central Division of the U.S. (including Louisiana) provide a general context for discussion of worker availability in the cane region. During the period 1870-1890, of all regions of the United States, the South Central Division had the highest percentage of total population engaged in agriculture (over 63% in 1900); the highest percentage of all occupied males engaged in agriculture (66% in 1900); and the highest percentage of all occupied females engaged in agriculture (50% in 1900). However, caution must be exercised in applying these statistics specifically to cane agriculture, since the South Central Division was also a major cotton-producing region. In the South Central Division, raw numbers of persons engaged in agriculture grew more slowly than all other occupational categories (professional services, domestic and personal services, trade and transportation, and manufacturing and mechanical arts) between 1880 and 1900. In fact, "persons engaged in agriculture" was the only labor category to grow more slowly in this period than the population as a whole. The percentage of all workers engaged in agriculture in this region decreased over 8% between 1870 and 1900. The drop in agricultural laborers as a percentage of all workers in the United States as a whole was much greater in this same period. The percentage of all gainfully employed American workers engaged in agriculture dropped from 44.4 % in 1880 to 35.7% in 1900 (Quaintance 1904:35-38, 95-98; Slichen Van Bath 1960:19).

The number of persons in the South Central Division engaged in agriculture relative to other occupations declined between 1880 and 1900, but the absolute number of persons engaged in agriculture grew some 55% during this same period. The number of agricultural

laborers in this region grew about 38% in the last two decades of the nineteenth century. During this same period, the acreage in sugar cane production in the South Central Division increased by about 60% (Quaintance 1904:93, 103). Although the Census figures do not specify workers in different aspects of agriculture, they do suggest that fewer workers were available for working greater areas of sugar cane.

Interestingly, the decreases in percentages of persons engaged in agriculture in the South Central Division differed for males and females. The percentage of all males engaged in agriculture decreased by 9% between 1870 and 1900, but the percentage of all females engaged in agriculture decreased by only 3.4% during the same decades (Quaintance 1904:35-38). As discussed below, female participation in agricultural labor was reduced from antebellum levels after the Civil War. These statistics also suggest that fewer employment opportunities outside of agriculture were available for female workers than for male workers in this period.

Ferleger (1982) contends that sugar planters created perceptions of "labor shortages" in the cane region because they were unwilling to raise pay above the prevailing wage, while at the same time resisting improvements in production methods (Ferleger 1982:31-32, 34). As has been discussed, at least part of this contention seems untenable for the period between 1865 and 1910. Dramatic increases in labor efficiency resulted from technical advances in the 1880s and 1890s, but these advances did not eliminate problems caused by shortages of labor for the crucial harvest season. There was not a surplus of harvest-season labor despite advances in cultivation technology because production levels were rising more rapidly than the supply of seasonal labor. The shortage of seasonal labor remained a headache in the twentieth century, as the pace of technological innovation increased, until the natural disaster of mosaic disease caused production to plummet.

A major source of seasonal cane workers, after the initial use of immigrant labor declined in the early 1870s, were share tenants of the cotton parishes. This was possible because cotton and sugar were harvested at different times of year (Ferleger 1982:32). By 1930, it had become far more difficult for planters to draw upon a labor reserve of under-employed workers during harvest season; planters in St. Mary Parish thought this was because of outmigration of African-Americans and the drying up of the immigrant labor pool (Vance 1932:222-223).

Demographic statistics indicate the extent of outmigration of African-Americans from the sugarcane region, and St. Mary Parish in particular, in the late-nineteenth and early-twentieth century. Between 1860 and 1880, the African-American population of St. Mary Parish had decreased from about 13,000 persons to about 11,000 persons. The African-American population of St. Mary Parish thus experienced an absolute population decline of about 8.5% during the war and Reconstruction years while in the state as a whole, the years 1860 to 1880 saw a strong increase in African-Americans as a percentage of total population. Much if not all of this decline in the African-American population of St. Mary Parish can be attributed to the creation of Iberia Parish from St. Mary Parish territory, and it is probable that populations were actually growing during this period. After 1880, St. Mary Parish reflected particularly strong overall population growth. By 1900, total parish population had reached 34,145 persons (Goins and Caldwell 1995:52), more than double the 1880 total. However, the overall population of St. Mary Parish went into decline during the early decades of the twentieth century. Between 1910 and 1920, St. Mary Parish lost almost 22% of its total population, declining from 39,368 persons to a total of 30,754 (Broussard 1977:95), smaller than its population at the turn of the century. The majority of this population loss was due to outmigration of African-Americans.

Throughout the sugar-producing parishes, population decline was comparable as large numbers of African-Americans migrated to urban centers and other areas in Louisiana and out of the state. There were several reasons for this trend of African-American migration out of

the cane regions. Mosaic disease had begun to strike Louisiana cane stocks in 1912 and several years of bad weather followed, reducing demand for cane workers (Begnaud 1980:45). In addition, economic opportunities for African-Americans improved regionally and nationally during the World War I years.

Wage Labor vs. Share Tenancy

An important distinction between sugarcane plantations and cotton plantations was the characteristic adoption of wage labor on the former and share tenancy on the latter during the post-Civil War era. The difference between the two great Louisiana plantation systems remained into the mid-twentieth century. There were several reasons for this circumstance. One major cause of this difference was the nature of commercial sugar cane production, which was more labor- and capital-intensive than cotton. The cultivation of sugar cane is more complicated than cotton, requiring a larger workforce per acre and greater coordination of activities. Once harvested, a large amount of capital was required to efficiently process the crop into a marketable commodity, since a sugar house was a much larger investment than a cotton gin. In addition, "sugar culture demands too much centralization and integration for the typical plantation organization of share tenancy... small farm production [of cane] by owners instead of day labor under supervision... would place insuperable difficulties in the way of coordination for large-scale production" (Vance 1932:221-222). These circumstances militated against the rise of small, independent or tenant cane farmers, although it is erroneous to conclude that there were none in the post-Civil War period.

Wage labor rather than share tenancy emerged predominant on the large cane plantations in the aftermath of the Civil War. From 1862, the presence of the Union Army in the cane region agitated the slaves, and plantation discipline broke down. Seeking to restore some measure of order, Generals Benjamin Butler and his successor Nathaniel Banks issued labor orders regulating the employment, wages, and treatment of the freedmen in their district. During harvest season for the 1862 crop, the Union military forced fugitive slaves to work on the sugar plantations, provided military enforcement of labor discipline on the plantations of "loyal" slaveholders who promised to pay wages to their slaves, and organized sugar production on confiscated estates. These efforts by Butler failed, because the as-yet unemancipated slaves were rarely paid and many left their plantations. Under Banks, nominal wages were to be paid or a crop share arrangement made for one-year labor contracts. This system functioned poorly. In 1864, new regulations were issued. Written contracts for plantation laborers were required, and were to include rations, clothing, living quarters, medical attention, and schooling. Wages varied from \$8 per month for a "first-class" field hand to \$3 per month for as "fourth-class" field hand (Cross 1939:9-13; Scott 1994:73).

From the perspective of the planters seeking labor, the rates of pay established by Banks were low even by antebellum standards for hired laborers. Before the Civil War, labor had also been in short supply at times, and cane planters hired extra hands from other slave owners at from \$160 to \$200 per year (\$13-\$17 per month), plus clothing, rations, and medical care (Nordhoff 1876:56). Even at the low rate of pay established by Banks-- about \$.38 per day for an excellent worker-- planters were dubious that they could prosper under this system given postwar conditions (Cross 1939:9-13; Ferleger 1982:27). Despite good sugar prices in the late 1860s and early 1870s, capital was in short supply on the cane plantations. Many sugar houses were destroyed or damaged in the war, and had to be rebuilt or refitted. Livestock had been decimated in many areas, and new mule teams had to be acquired, along with any implements needed to replace lost or damaged equipment. Seedcane stocks had to be replenished. Many planters unsurprisingly took the expedient course of housing their workers in the old antebellum quarters, rather than invest in new housing for their workers. Then too, laborers were dissatisfied on many plantations by restrictive conditions and poor pay. Some of them disrupted the work routine, and many moved to other plantations when their year-long

contract expired. To the planters' chagrin, wages almost immediately began to rise since labor was in short supply (Ferleger 1982:27; Scott 1995:76).

Despite a lack of enthusiasm, the planters began to hire former slaves out of necessity. Records suggest that the terms of contracts were usually fulfilled by the planters during the last year of the War (Cross 1939:9-13). Freedmen, however, were reluctant to sign contracts with the planters, partly because there was a widespread expectation of land redistribution. In 1865, General Joseph Fullerton, head of the Freedman's Bureau in Louisiana, stated that land would not be redistributed. Former slaves remained wary of contracts until about 1868-1869, as long as the Freedman's Bureau remained in operation in Louisiana. A small number of alternatives to the paternalistic pattern of plantation proprietor and gang-labor workers were attempted by the Freedmen themselves. At a few sugar plantations, "labor companies" of freedmen were established, who tried to assert a degree of proprietorship over land and control their own crops and work regimes. However, these experiments did not survive the revival of traditional proprietary rights in the region following the withdrawal of direct Federal military supervision (Ferleger 1982:27-28; Scott 1994:74).

With the end of Federal military regulation of the labor market, there came a period of adjustment. The cane planters were distrustful of the freedmen and retained an antipathy to allocating cane lands in small parcels by lease or sale. A number of African-American delegates to the 1868 Louisiana constitutional convention proposed breaking up the large estates by limiting the size of tracts that could be bought at tax sales and by increasing the taxes on uncultivated land. These proposals were not accepted. The sale of plantation tracts continued at a brisk pace during the post-Civil War period, including from tax seizures and sales, but most conveyances of plantation lands remained for large acreages. The planters preferred to insure sufficient labor for staple-crop production with long-term labor contracts, rather than share tenancy arrangements. Since many freedmen were reluctant to sign restrictive contracts and return to plantation labor, shortages of workers immediately became a problem. Some of the terms of the earliest post-war contracts with sugarcane workers were impossible to impose within a matter of a year or two. Downward pressure quickly began on the length of work hours and restrictions on the keeping of livestock by workers (Cross 1939:9-13; Scott 1994:74-75).

At the end of the 1860s, wages for cane workers on the plantations continued to rise as shortages of workers on the cane plantations became acute, particularly during grinding season. One planter complained that "the old men only are found working on plantations, the young and best hands having settled in villages or cities, and the women having withdrawn entirely" from the fields (quoted in Wade 1995:88). Several proposals were made by various authorities to alleviate the situation. One idea was to subdivide the sugar estates and have white small farmers become part owners, replacing African-American laborers. This proposal ran up against the unwillingness of the plantation owners to subdivide their tracts. The use of immigrant labor seemed like a sensible solution to some. Chinese laborers were brought in from the West, but fear of their permanent residence in the cane region made planters reluctant to continue this practice. Among the social "problems" feared by planters was the development of an immigrant land-owning class in the cane region (Ferleger 1982:29). In the event, the importation of Chinese laborers into the sugar region was on a small scale; fewer than 500 Chinese resided in Louisiana in 1880. Planters began to bring in other seasonal workers by rail for 30 or 60 days during harvest, and although this was an expensive means of obtaining labor, it lasted to a limited degree into the twentieth century. The renewal in the 1880s of larger-scale immigration of cane workers, principally from Italy, is discussed below.

Cane workers' wages continued to rise in the early 1870s, climbing to between \$18 and \$20 per month plus rations in 1873. However, the national economic panic of 1873 reverberated in the cane industry; sugar prices began to decline, and planters tried to lower their costs.

In 1874, the planters of St. Mary combined to depress wage rates to \$15 per month. Planter combinations were very difficult to achieve and maintain, and were only intermittently effective in forcing lower wages. In some places, cane workers responded by forming "Laborer's Constitutions" or collective associations to withhold labor from the marketplace, but these organizations too were of limited effectiveness (Shlomowitz 1984:577-578).

By the mid-1870s, the attitude of cane planters toward the use of African-American wage laborers had changed from that held during the last years of the War and immediate post-War years. For one thing, the use of wage labor had proven profitable, and planters recognized that their fears in this regard had proven groundless. In fact, some planters felt that African-American laborers were "the best laboring class in the world" (Nordhoff 1876:56, 69) despite what they perceived as faults among them. The major flaws of the freedmen, these planters felt, were carelessness about tools and implements owned by the planter, and a frequent disregard for the planter's proprietorship of livestock (Nordhoff 1876:70). Planters hoped that allowing the workers to raise livestock on the plantation property would curb this latter tendency. Meanwhile, many planters found the freedmen to be generally tractable, good workers; they were generally scrupulously honest when it came to money, allowing scrip and credit systems to function well for the planter. Regular wage laborers on the cane plantations in 1875 were earning a depressed wage of \$13 to \$15 per month, but also received a house (usually two rooms), a garden patch, and a ration of pork and corn meal; they were allowed to raise livestock on the plantation and to cultivate a corn patch with the planter's teams. Some sugar plantation owners sold their laborers small tracts of one or two acres on the plantation, but there remained a general reluctance on the part of sugar planters to sell land to their wage laborers (Nordhoff 1876:70).

The cane planters may have been generally satisfied with the quality of African-American workers, but the workers themselves were not necessarily satisfied with the conditions and terms of their employment. There is some evidence that African-Americans considered working on a cane plantation to be less preferable than other occupations. Commentators in the 1870s perceived a typical aversion to gang labor among African-Americans of the Deep South; it was too reminiscent of slavery. Gang labor was usual on the cane plantations, and workers otherwise had less personal autonomy on the cane plantation than they did as cotton sharecroppers. Cane agriculture in general and harvesting in particular was widely viewed as among the most onerous forms of agricultural labor (Shlomowitz 1984:581-583).

It is difficult to say how the prevailing cane plantation wage compared to other wage labor available to African-Americans in the region at this time. African-Americans working as railroad track layers and menders in the mid-1870s received \$1.57 per day, of which \$.60 was paid daily to a black foreman for food; the workmen shifted for themselves when it came to shelter on the job (Nordhoff 1876:70). From a gross wage of about \$40.82 per month (calculated on a 26-day work month), these railroad workers paid about \$15.60 for food, clearing about \$25.22, without considering housing costs. Relative to railroad labor, the cane plantations seem not to fare too poorly in comparison. Cane plantation wages may also have provided a higher standard of living than cotton sharecropping in some cases (Shlomowitz 1984:583-585). It is likely that non-pecuniary considerations affected the choice of laborers to work on cane plantations or a particular individual plantation. The limited alternative economic opportunities for African-Americans within the cane region should also be remembered when assessing how full-time plantation labor may have been viewed by potential workers.

The cane plantation workers were usually paid in two different ways in the mid-1870s. If there was no store on the plantation, they usually received one-half of their pay on a monthly basis and the other half at the end of the year. If there was a plantation store, the great majority of wages seems to have been paid in credit, and advances in goods were counted against an annual settlement. On some plantations, the workers received plantation scrip or tokens in-

stead of cash, the scrip, of course, only being useable at the plantation store. The wage/credit accounts of the individual workers were typically managed so that there was a sum remaining in credit at Christmas, which the workers usually spent at the store rather than saving in cash. Workers who ended the year without a balance tended to seek better terms elsewhere (Nordhoff 1876:70-72; Yakubik et al. 1994). Perhaps unsurprisingly, credit systems with their obvious advantages to the plantation owners in general seem to have been unpopular among the cane workers (see below).

Plantation stores were usually the major source for consumer items for the cane workers, but were not the only ones. Waterways were plied by state-licensed peddling-boats selling whiskey and other items. Planters complained that these boats tended to carry "all the spare cash" out of a district as well as most of the chickens and other "truck" of the plantation workers (Nordhoff 1876:72).

The \$15 per month wage rate established by the St. Mary planters in 1875 held through 1876, but in 1877, the wage rate climbed back to \$20 per month. In 1878, the planters again combined to lower the rate to \$15 per month plus rations, where wages seem to have stayed through 1880. By 1881, however, the sugar plantation labor market was again fully competitive, the combination of planters having broken down. Enforcement mechanisms of the planter combinations were always weak, and the temptation was strong to lure extra workers to the plantation with higher wages if a good crop needed to be harvested (Shlomowitz 1984:578).

Union organization of sugar plantation workers was not substantially successful prior to the mid-twentieth century. Strikes did occur, but were usually small and quickly suppressed by the planters (Ferleger 1982:32). There were some exceptional strikes. Perhaps the most dramatic series of events in the post-Civil War history of Louisiana sugarcane plantation labor occurred during the 1880s, centering on Terrebonne and Lafourche parishes. In November 1887, some 6,000 to 10,000 cane field laborers went on strike to protest attempts by planters to lower wages and pay workers in scrip. Led by members of local Knights of Labor assemblies, the strikers were predominantly African-American but some white workers were also involved. The planters convinced the Governor to send in the state militia, who set up a Gatling gun in the town square of Thibodeaux and assisted planters in evicting striking workers from their cabins. On November 22, unknown parties fired on two white men, and subsequently vigilante violence broke out. At least 30 African-Americans were killed in what has been called the Thibodeaux Massacre (Scott 1994:80). In St. Mary Parish, a smaller strike resulted in the death of four African-American workers at the hands of Sheriff's deputies (Wade 1995:181).

The sugar strike of 1887 seems to have been the last large-scale labor organizing activity in the cane region until the twentieth century (Ferleger 1982:32). Some planters felt that the younger workers were not as reliable or as hard-working as the freedmen raised in the antebellum period, and there was renewed interest in the use of immigrant laborers. It may be that planters were reflecting increasingly intense racism during this period (Babson 1989:45), but they were certainly interested in finding more tractable workers. Recruiting immigrant labor seemed one obvious solution despite dissatisfaction with immigrant labor in the 1860s and 1870s. Chinese laborers could no longer be obtained because of the Asian Exclusion Acts passed by the U.S. Congress in the early 1880s, but large number of southern Europeans, particularly Italians from Sicily, were already beginning to flow into New Orleans. By the mid-1880s, large numbers of Italians were recruited from New Orleans, St. Louis, New York, or even directly from Sicily (Wade 1995:181-182) for seasonal work (*la zuccarata*) on the cane plantations. Often these Italians worked under a system in which a bilingual *patrone* interceded between the planters (or their agents) and the workers (Babson 1989:46). Although Sicilians never became the predominant full-time workers in sugarcane agriculture, many

settled permanently in Louisiana. In 1890, there were 207 Italian immigrants resident in St. Mary Parish; in 1900, there were 1039 Italians in the Parish (Wade 1995:181-182).

The influxes of immigrant workers probably significantly alleviated labor shortages, and reinforced downward pressure on wages. At least some of the workers and families brought directly from Sicily seem to have been in semi-indenture arrangements, the expense of their passage to Louisiana counted against future wages. At any rate, some Sicilian sugarcane workers may have been paid well below the prevailing wage rates for sugarcane labor (Babson 1989:47), at least temporarily. By 1895, the daily wage of sugarcane workers was the lowest among workers producing all major commercial crops (including cotton and with the single exception of sweet potatoes) in the United States (Quaintance 1904:60-66). However, it is not known if the ration of foodstuffs had continued into the 1890s, and whether this was included in these particular calculations of the low rate of pay for sugar workers. Ethnic tension between Sicilian and African-American workers was encouraged by the planters, and by the mid-1890s made collective bargaining or any other cooperation among the workers very difficult. Some planters by the mid-1890s had already grown to dislike Sicilian laborers and sought to replace them again with African-Americans (Babson 1989:46-47).

The inability of sugarcane workers to organize effectively probably contributed to the stagnation of wages in the mid-1890s, and wages for cane workers stayed relatively flat into the early-twentieth century. In 1890, wages stood at \$1.25 per day; by 1907, female cutters received \$1.25 per day, male cutters \$1.50, and loaders, \$1.75. In 1910, a year when labor was in less short supply, the prevailing wage was back at \$1.25 per day for first-class cutters (Wade 1995:181, 207, 215). The immigrants frequently left the plantations as soon as better work could be found. After 1910, the shortage of labor in cane agriculture seems to have abated (Ferleger 1982:32). This was probably due in part to a series of poor harvests caused by mosaic disease (after 1912) and poor weather (Beganud 1980:45). Adequate supplies of labor may have been available until the World War I era, when outmigration of African-Americans accelerated. In 1918-1919 planters complained of an acute shortage of labor, and blamed the situation on military service, influenza, and the migration of young men to the cities (Wade 1995:256, 259). It is not clear that wages rose appreciably during this period.

The wages of sugar workers do not fit the general pattern for agricultural workers in late-nineteenth and early twentieth-century America. Moreover, the wages of agricultural workers seem to have followed an inverse correlation to the overall price pattern of the American business cycle of the late-nineteenth century. In the U.S. as a whole, agricultural workers' wages generally dropped during the 1870s, whereas in the economy as a whole prices were generally rising until 1873. Agricultural wages after 1873 generally increased for the remainder of the century, while overall prices were falling between 1873 and 1896 (Slichen Van Bath 1960:21). Mechanization in agriculture probably played a significant part in fluctuations in wage rates of agricultural workers. Generally, mechanization in American agriculture was accompanied not only by a decline in the numbers of workers per unit of crop produced, but also by a rise in wages of agricultural workers. For example, the daily wages of agricultural workers in wheat production (which became highly mechanized before 1890) more than quadrupled from \$.57 in 1855 to \$2.47 in 1895 (Quaintance 1904:13-14; Slichen Van Bath 1960:21).

Regionally, agricultural workers in the South Central Division generally experienced rising wages from 1869 to 1894, while prices were generally falling. After 1894, wages declined to 1880s levels while prices were generally rising. The limited data available suggests that workers in sugar cane production experienced a rise of wages between 1865 and 1873, stagnation between 1874 and 1881, and then a rise to a plateau about 1890. Wages then seem to have been fairly stable until the World War I period, when they began to rise again. In 1910, cane workers' wages were only about 38% higher than they were in 1873. Thus, wage

levels of cane workers do not seem to correspond to either a national pattern or a regional pattern of agricultural wages. Explaining the difference is a difficult task. Technological change in the sugar industry may have had some impact on daily wages of workers in sugar production, particularly after the mid 1880s. However, wages obviously did not increase for workers in sugar production in this period at rates similar to those for other crops that were becoming increasingly mechanized.

Despite advances in the mechanization of cane agriculture prior to 1900, cane was still harvested by the manual labor of large numbers of seasonal workers, many of them female, almost until World War II. This may explain some of the difference between wages of workers in sugar production and wages of workers producing other crops, since women were generally paid less than men as laborers. Hoe gangs in the antebellum period were made up of both sexes, and this continued into the post-Civil War era; however, cultivation (rather than harvesting) of cane was most affected by technological change in this period. Plowing replaced much weeding with hoes, and most of the new agricultural labor tasks created by mechanization fell to men. In addition, freedmen in the Reconstruction period preferred for women of their families not to work in the cane fields, and women largely vanished from the full-time labor force on cane plantations (Nordhoff 1876:72; Wade 1995:88). However, women and even children continued to work seasonally, if at a level reduced from the antebellum period (Vance 1932:223; Cross 1939:11). In 1880, about 25% of agricultural laborers in the South Central Division were female, and in 1900, still about 24% were female (Quaintance 1904:36-38, 99), suggesting that little change occurred in division of labor among the sexes during those decades. It seems that by 1880, most cane cultivation work was already performed by males, and that females were usually employed in cane agriculture only during harvest season. Technological improvements in cane agriculture between 1880 and 1900 may thus have had a differential impact on male and female plantation workers, but cannot explain the overall low wages of cane workers.

Many African-American workers stayed on the sugarcane plantations because they had few viable alternative options (Scott 1994:77-81). Generally speaking, opportunities to purchase land in the sugar region were rarely afforded to African-Americans, and there were few available jobs outside of plantation labor in the sugar-growing parishes. African-American workers in the cane region also did not fully share the geographical mobility enjoyed by white workers in the Post-Reconstruction era. Efforts to limit the mobility of African-Americans were embodied in false-pretense and anti-enticement laws that were enacted to restrict the recruitment of African-Americans in the southern states for labor in the northern states. Meanwhile, until the World War I era, northern industry was ambivalent about recruiting African-American labor in the south. The Louisiana legislature even considered vagrancy laws to force the underemployed back to work on sugar plantations (Ferleger 1982: 32-34). Despite these limitations, outmigration from the cane-growing region was still substantial and increased in the early-twentieth century, as noted above.

It is likely true that technological change, restrictions on mobility, immigration, and lack of alternative economic opportunities (including private farm ownership) compensated somewhat for a relative decline in the population available for agricultural labor in the cane region; these conditions allowed living standards and wage rates for workers on sugar cane plantations to remain static, or to change relatively little, for nearly two generations before the Second World War. However, other factors were also undoubtedly at work, and much more data concerning sugarcane plantation workers is needed. In particular, more information is needed about the dynamics of wages rates after 1900, and details of non-wage remuneration such as housing, supply of food staples, and credit systems at plantation stores.

Plantation wage labor was not the only option for African-Americans in the cane region. There can be little question that relatively few African-Americans were among the small

farmers growing cane for sale to the large central factory concerns late in the nineteenth century. However, it is not strictly true that African-Americans were excluded from land ownership or from the ranks of independent cane growers in the sugar parishes. In the 1900 census, 2,964 white farmers in Louisiana listed their principal source of income as sugar, while 906 African-American farmers, constituting 23% of the total number of cane farmers, also did so. In St. Mary Parish, there were 248 sugarcane farms owned and operated by African-American farmers in 1900. Of course, this is a gross underrepresentation of African-Americans, given the proportion of the total St. Mary Parish population they constituted. In the cotton sector, by way of comparison, larger numbers of African-Americans owned and operated their own farms. African-American farmers made up some 64% of total cotton farmers in the state (Scott 1994:80-81). Perhaps more significantly, only 14.6% of all black-owned farmland in Louisiana was in the sugar region in 1900, and this had shrunk to 10% by 1910 (Ferleger 1982:33). Thus, it is likely that either more cotton farms were being purchased by African-Americans by 1910, or the absolute number of independent black sugar planters had declined. Clearly, it was more difficult for African-Americans to establish themselves as independent farmers in the cane region than in the cotton parishes.

The share tenant system was predominant in the cotton region but was also present in the cane-growing area. Following labor strife in Terrebonne Parish in 1873 and 1874, some planters experimented with 5-year tenant-labor contracts. "Squads" of about a half-dozen tenants were organized, and about 10 acres of land distributed per hand. The planter furnished the cane land, seed cane, houses, firewood, fences, and land for a corn patch. The tenants supplied teams, tools, and labor, and were responsible for feeding themselves (on advances from the planter). When the cane was ready for harvest, the planter took charge of the operation, directing all teams and men. Extra hands were hired for the harvest season, and the tenants paid half the cost of these workers. The tenants received one-half of the value of the cane. While most of these tenants were white, some squads were made up of African-Americans (Nordhoff 1876:71).

Many cane planters were reluctant to surrender the centralized supervision of the wage-labor system for cultivation, and therefore tenancy remained limited. On a statewide basis, of the 3,870 sugar farms in Louisiana in 1900, 1,871 (48%) were operated by owners, 240 by part-owners, 18 by owners and tenants, 305 by managers, 544 by cash tenants, and 892 (23%) by share tenants (Scott 1994:80-81). In the five leading sugar parishes (which included St. Mary), the percentage of owner-operators was probably higher; 59% of all farms were operated by owners in 1900. Likewise, the percentage of share tenants was probably somewhat lower, since 18% of all farms in the leading sugar parishes were operated by share tenants (Schmitz 1979:279). Still, while the large owner-operated plantations probably produced the lion's share of cane, in 1900, almost one-quarter of all sugar farms in Louisiana were operated by share tenants. Yet more surprisingly, in 1900, slightly more than one-half of all sugarcane farms in the state were operated by cash or share tenants. Between 1900 and 1930, there was a significant decrease in the percentage of owners as operators of all farms in the leading sugar parishes, to 45%, or nearly a 14% decline since 1900. Similarly, the percentage of share tenants operating farms in the leading sugar parishes in 1930 stood at 26%, an 8% increase since 1900. Together, cash tenants and share tenants operated 35% of all farms in the leading sugar parishes in 1930, up from 26% in 1900 (Schmitz 1979:279).

The above statistics indicate that although share tenancy in cane agriculture was not predominant in the period from the Civil War to the Great Depression, it was more common than sometimes suggested, and seems to have increased in the first three decades of the twentieth century. The implications of this fact for an interpretation of the social and economic context of plantation material culture should not be ignored.

Plantation Quarters Housing and the Plantation Landscape

Current theories of the cultural importance of plantation architecture and landscapes (e.g. Lewis 1985; Howson 1990; Vlach 1991, 1993; McKee 1992; Oszuscik 1992) generally suggest that the architecture of antebellum plantation great houses, slave quarters, and even sugar houses, as well as the layout of plantation buildings, emphasized the power relationship between the planter and his slaves. The wider plantation landscape, some of these scholars suggest, became a realm in which the slaves' drive for cultural and personal autonomy interacted with the countervailing drive of the planter to dominate the slave and his mentality. These theories were largely developed for the non-sugar growing antebellum south but may be applicable to southern Louisiana as well (*viz.* Yakubik et al. 1994). However, these theories shroud motivations for building structure, location, and use in a greater complexity than is sometimes useful for practical study. For example, sugar houses probably did emphasize, most likely unconsciously, the power relationship between the planter and the laborer. However, their design (except for cosmetic details) was usually highly functional and their location determined more by conscious considerations such as field layout. In the era before plantation railroads, it would make no sense to place a sugar house anywhere except near the center of the cane fields, no matter how impressive it might be in another locale. Similarly, the dialogue among antebellum planters concerning the "appropriate" forms of quarters housing dwelt quite explicitly on the subjects of hygiene, health, and economy; little was said about reinforcing the message of planter dominance that was conveyed in other obvious ways beside the size differential between the great house and a slave cabin. It seems likely that planters actually sought to achieve a number of related goals with the sort of quarters housing they constructed for their slaves. Among these motivations of planters could have been a desire to house their slaves in an economical and healthy way; to reflect their concern for their human property; to serve as mechanism controlling slave behavior; to encourage productive and stable slave families; and to convey to the slaves a sense of their inferior status (McKee 1992:204).

A recent survey of quarters housing on the Louisiana sugar plantations (in Yakubik et al. 1994) suggests that the "reform" of slave housing by southern planters in the later antebellum period had an impact in this region. The most prevalent form of quarters housing on the sugar plantations were double wood-frame cabins, housing two families. These "saddlebag" cabins (with a single central chimney) typically had two rooms or two rooms plus a loft on each side of the chimney. The size of these cabins varied a great deal; cabins on some plantations had twice as much interior floor space as cabins on other plantations. Many of the cabins had built-in galleries, but many did not. Quarters houses frequently were surrounded by small fenced yards, some of which contained gardens or livestock pens. The cabins were usually arrayed in one or more lines along the "street." Privies or outhouses were evidently not common, and waste was disposed of in the drainage ditches that criss-crossed the quarters (Yakubik et al. 1994).

In the period immediately after the Civil War, a pervasive lack of capital among freedmen and planters alike precluded much new construction of plantation worker's housing. On cotton plantations, share tenancy eventually led to a dispersal of the tenant population, whereas on sugar plantations, the centralized labor system allowed antebellum quarters complexes to remain in use for the housing of wage workers (Orser 1988a:90-92). Some former slaves refused to live in the antebellum quarters, but for many there was no alternative. Although the documentary and archeological record of plantation quarter living conditions is not complete, it is evident that in the decades following the Civil War there was some progress in the living standards of quarters inhabitants. In some cases the weather-proofing of cabins was improved by lathing, plastering, the glazing of windows, and replacement of wood-shingled roofs with sheet metal. It was usual in the post-Civil War period for the number of people residing in smaller double cabins to be reduced to a single family unit. In most cases, a door was cut in the interior wall to connect what had been the two living areas of double cabins, resulting in

one of the rooms being used as a living room and the other as a bedroom (Rehder 1971:171). It may be that larger cabins continued to be used as two-family dwellings. Sometimes shed-roofed additions to the antebellum cabins were made, often containing a cast-iron stove and used as a kitchen. Cast-iron stoves were also sometimes inserted into the open brick fireplaces of older cabins. By the 1930s, "model" plantation quarter houses were considerably larger and of better finish than antebellum cabins (American Sugar Cane League 1939). However, a Federal government study conducted in the 1930s found that many plantation residents did not have kitchen ranges in their homes (Orser 1988a:123) and were still relying on simpler stoves or open fireplaces. As late as 1936, the majority of sugar plantation workers were living in houses of only two rooms, although some had three or more. None of the houses in the sample of this 1936 study had screened windows or doors, although most had porches (Sitterson 1953:390).

In southern Louisiana, the quarters complexes of large plantations were generally part of a comprehensive arrangement of buildings that typically followed one of two forms: the linear plan or the block plan. Linear plantations were influenced by the long-lot land-use patterns of settlement along the Mississippi River, and were characterized by the plantation buildings arranged in a line running from the river toward the backswamp. At plantations laid out in the block plan, the quarters and other buildings are arranged in a square of rectangular pattern, with the sugar house and outbuildings forming the nucleus of the arrangement. The block plan was characteristic of buildings established by Anglo-American planters (Rehder 1971:82-84, 96-98). North Bend Plantation fits neither of these patterns, since its quarters were constructed parallel to Bayou Sale rather than perpendicular to it, and the industrial complex, north of the quarters, is neither balanced by a great house nor the focal point of a block arrangement (Figure 5).

The mechanization of cane cultivation and industrialization of cane processing had substantial effects upon the plantation landscape as a whole. The development of plantation railways greatly increased plantation size. Railways had a mixed effect, however, on the rationale for compact plantation quarters and industrial complexes. Main line railways could bring workers in for the cane harvest, but the deployment of workers on a daily basis was best served from a central quarters area on the plantation rail line. The introduction of immigrant workers, and resulting ethnic tension between them and African-Americans, at least sometimes brought about segregation of workers' residences (Babson 1989:48-49). The plantation railways also brought about an expansion in the area utilized by plantation industrial complexes. As the capacity of the sugar factories grew, larger areas were required for cane and bagasse storage in proximity to the factory. The expansion of the factories probably resulted in successive re-use of antebellum structures and their eventual replacement with new buildings or functional areas.

A review of scholarly literature on sugar plantations and preliminary research suggests several important points. First, the fact of emancipation fundamentally altered the relationship of the planter to his labor force. However, the resulting relationship between plantation owner and laborer was not uniform in the cotton-growing south and the sugarcane region. The wage labor system that predominated on the cane plantations appears to have been less restrictive than the share tenancy arrangements that prevailed on cotton plantations after the Civil War. The mobility of cane workers was greater than that of tenant farmers, whose relationship with the plantation owner eventually rigidified to virtual debt peonage. Nonetheless, several factors complicated the relationship of cane planters to their labor force. Labor was chronically in short supply in the cane region for the period from 1865 to 1940, with the exception of several limited intervals of time. In addition, the cultivation and processing of cane was undergoing a technological revolution in the same period, with profound impact upon the requirements for full-time, as opposed to seasonal, plantation labor. The labor requirements in cane cultivation were consistently reduced, sometimes dramatically, by the adoption of technological innova-

tions. The plantation workers in this period by necessity became more skilled than the gang laborers of the antebellum period, but this seems not to have been accompanied by greatly increased remuneration or heightened social status. On the other hand, greater acreage in production and advances in processing efficiency provided the cane planter with economies of scale, helping them to compete with tropical cane growers but perpetuating sometimes acute labor shortages. Lastly, national and regional economic and demographic factors affected the relationship of the planter to his labor force in different ways than was the case under slavery. The complicated interplay of these several factors is not yet fully understood, and provides wide latitude for interpretation. This dynamic historical context should be manifested in the material culture of plantation life, as conceptions of the planter-laborer relationship and access to consumer goods changed over the course of the late-nineteenth and early twentieth century. The degree of change, or even lack of change, in these dimensions of plantation life is an equally important and interesting avenue of inquiry.

Previous Archeological Investigations at Louisiana Plantations

Louisiana plantation sites have been the subject of archeological investigation for approximately 20 years. While much of this research has been undertaken as the result of Section 106 compliance, some projects have been funded by historical groups interested in the subsurface remains preserved at specific estates and/or to determine the National Register status of cultural deposits. As has been the case elsewhere, the focus of plantation research until relatively recently has been the great house and its occupants, while the remains associated with the African-American laborers who built and provided the labor for the support of these estates have received less attention. In particular, the dynamic relationships of African-Americans, as slaves and as freedmen, and plantation owners was addressed by Yakubik et al. (1994) and Wilkie (1994), based on excavations at Ashland-Belle Helene (16AN26) and Oakley (16WF34) plantations, respectively. Of special importance in these relationships is the access by laborers to material goods, which were generally controlled by the planters. A major theme of such work is the continuation of African cultural practices in a socially repressive atmosphere by adapting articles of Euro-American origin.

The following discussion provides an overview of the major investigations conducted at Louisiana plantation sites and their research foci. While the industrial components of plantations have received increasing attention, particularly in recent years (e.g., Maygarden et al. 1994, Yakubik 1994; Braud et al. 1997), the emphasis below is on investigations within the habitation areas of plantations, since the remains within the project corridor at both 16SMY66 and 16SMY132 are residential.

Magnolia Mound Plantation (16EBR30) was one of the first estates to be examined archeologically. In 1977, Coastal Environments, Inc. (CEI), was contracted to find the remains of the 1830s dependency kitchen that had been located behind the great house. The testing strategy included archival research, review of notes from previous excavations by Haag and Castille (no report available), auger testing, probing, metal detecting, and excavations. A map of the plantation from 1880 was enlarged to match the scale of the current site map. The maps were overlain to match the locations of structures. Unfortunately, the distortion caused by the inaccuracy of the 1880 map greatly reduced the usefulness of the overlays to locate the kitchen (Burden and Gagliano 1977:14).

Based on the results of the auger testing, probing, and metal detecting, 23 excavation units were opened. Brick features were uncovered in nine of the units. These included structural foundations, a partial walkway, and hearth remains. Additionally, excavations uncovered a burnt clay feature. This feature was a lens of hard, burnt clay overlain by brick rubble and mortar, and underlain by a lens of gray ash and charcoal. This appeared to be a firepit.

Artifacts were identified and grouped into functional categories. Six categories were established: architectural materials, arms, clothing, activities, personal effects, and kitchenware. Percentages of artifact types were calculated and presented graphically. Ceramics were arranged into three categories: functional, typological, and morphological. Pearlware represented 62.3 percent of the ceramics. Creamware and whiteware, as well as other historic ceramics were also recovered. Other artifacts from the excavations included a variety of glass, metal, construction materials, personal items, and animal bone. Construction materials suggest that the kitchen was a wooden structure with glass windows and a slate roof. Artifact types indicate that the site occupants had a fairly high socio-economic position (Burden and Gagliano 1977:74).

The mixed vertical and horizontal distribution of artifacts and the orientation of various features indicated that the portion of the site which was excavated had seen considerable reuse during its years of occupation. Based on the excavation results and historic documentation, three models were developed for the location of the kitchen (Burden and Gagliano 1977:77-80). The most likely interpretation was that the kitchen measured 10 ft x 15 ft (Burden and Gagliano 1977:80) and was a parallel structure to the great house, located about 6 m northeast of the northeast corner of the great house (Burden and Gagliano 1977:76).

CEI subsequently undertook excavations at this estate in order to obtain data on the distribution of subsurface features and artifacts on a parcel acquired by the Board of Trustees of Magnolia Mound. Although a new acquisition for the Board, the parcel had formerly been part of the plantation. Testing was performed on all of the acquired property and portions of previously owned property which were most likely to be impacted by landscape changes. The survey strategy was designed to reveal general patterns of occupational intensity on the plantation (Burden and Castille 1981:1).

Shovel tests were excavated at 25 m intervals along a grid established across the site. Shovel tests were excavated to sterile soil, usually 35 to 50 cm below ground surface. Seventy shovel tests were dug, and 62 of these were positive. Most were positive for brick fragments (Burden and Castille 1981:4). Ceramics and glass were recovered mainly from elevated portions of the site. Additionally, a metal detector was used to test 30 m x 30 m areas in the vicinity of two structures shown on an 1880 map of the plantation. No subsurface foundations were uncovered, however, the results of the metal detection were mapped providing areas of high-probability for former structures. A total of six archeologically sensitive areas were delineated during the study.

The first archeologically sensitive area that was noted was a trash concentration located on a downslope on the north property boundary. Artifacts indicate that the area is an early-nineteenth-century trash deposit associated with a house or a kitchen. Remains of the associated structure were not recovered (Burden and Castille 1981:4 and 6). A second area appears to represent the location of one of the structures shown on the 1880 map. No foundations were revealed, however, the quantity of nails, the numbers and types of artifacts, as well as the location, suggest that the structure may have been a carriage house (Burden and Castille 1981:6). The second structure shown on the 1880 map, the stable, could not be relocated. Other archeologically sensitive areas include possible roads and associated ditches. A prehistoric projectile point was recovered from a ridge along the southern fence line of the property. There is a prehistoric component reported at the site, and this ridge provides an ideal location for prehistoric sites (Burden and Castille 1981:8-9).

A second plantation investigated in the late-1970s is Woodstock Plantation (16EBR35), located at the confluence of the Bayou Manchac and the Mississippi River. The site was originally recorded by Toth and Woodiel (1976), and in 1977, CEI conducted NRHP test excavations at the exposed historic midden. The research design was developed to determine if pre-

historic and early historic occupations were preserved; to determine the location of Fort Bute, an English fort established in 1765, in reference to the plantation site; and to recover evidence of the plantation main house, support buildings, and boat landing (Gagliano et al. 1977:5-6).

Comparisons of an 1879-80 and twentieth century topographic maps of the area indicated considerable bankline erosion and the probable loss of one structure to the river (Gagliano et al. 1977:14-19). The remains of the structures shown on the 1879-80 map currently lie on the batture side of the levee. The mapped locations of these buildings corresponded roughly with the outcrops of historic midden in the study area (Gagliano et al. 1977:19). Survey along the riverbank revealed a nearly continuous zone of midden overlying the natural levee deposits.

Testing at the site consisted of mapping, backhoe trenching, bankline profiles, and systematic surface collection. The survey area was divided into 20 m surface collection units (Gagliano et al. 1977:41). Stratigraphy revealed by trenching indicated that, along the upstream portion of the site, the midden was overlain by artificial levee spoil and overbank deposits, while the midden in the downstream portion of the site was directly overlain by the overbank deposits (Gagliano et al. 1977:20-22, 51). Trenching also provided evidence that the entire site area had been impacted by an early-twentieth century levee setback (Gagliano et al. 1977:99).

Based on artifactual, archival, and archeological evidence, the site area was occupied during the last half of the nineteenth century. Unfortunately, it appeared that the area where the buildings once stood had been cleared and graded during levee construction, and that evidence of earlier occupations had been lost to river erosion. Nonetheless, systematic surface collection proved to yield evidence of discreet use areas. Percentages of artifact types were calculated for each collection area. Artifact categories were glassware, ceramics, metal, and miscellaneous items (Gagliano et al. 1977:54). These categories were grouped into functional classes, such as consumerware, agricultural implements, and building materials (Gagliano et al. 1977:74). Chi-square tests revealed that the distribution of artifacts at the site was non-random (Gagliano et al. 1977:93-97). Artifact distributions indicated the probable presence of structures in three separate areas, although no foundations were uncovered. The presence of the great house in one area was suggested by numerous construction materials including pane glass and roofing slate (Gagliano et al. 1977:98).

During the 1980s, investigations were undertaken within the great house yards of two of the better known plantation sites near New Orleans: Elmwood Plantation (16JE138), and Destrehan Plantation (16SC18). Excavations at the former by R. Christopher Goodwin and Associates, Inc., were prompted by a fire which gutted what remained of the early-nineteenth-century great house; NRHP testing was undertaken to determine if the archeological component of the site was eligible for the National Register, since the great house was too badly damaged for nomination. Combining historical evidence and the results of magnetometer survey, excavation units and backhoe trenches were planned (Goodwin et al. 1983:4).

Research issues revolved around the patterns of French colonial material culture as compared to British colonial and early American patterns. It was anticipated that greater numbers of nineteenth-century goods would be recovered, as this was the period of most substantial occupations at the site (Goodwin et al. 1983:73-74). Artifact analyses, especially ceramics, were used to interpret changes in the cultural makeup and economy of the plantation over time.

Numerous features and foundations were encountered during the excavation of one of the backhoe trenches. Four excavation units were placed adjacent to architectural features encountered in this trench (Goodwin et al. 1983:116-135). Structural remains encountered

included the mud/clay floors and brick foundation wall of the detached kitchen (Goodwin et al. 1983:123, 244-245).

A wide range of artifacts were recovered from the excavations (Goodwin et al. 1983:136). These included ceramics, glass, metal, bone, shell, and architectural rubble. Ceramics, mostly dating to the late-eighteenth and early-nineteenth centuries, were the most diagnostic artifacts analyzed. The major ceramic types identified at the site were redwares, tin-glazed earthenwares, creamware, pearlware, whiteware, ironstone, and porcelain. Ceramic frequencies were utilized in seriation and the calculation of Mean Ceramic Dates (MCD) (Goodwin et al. 1983:182). The ceramic assemblage from the earliest period is dominated by creamware with some redware. The middle sequence sees a rise in the popularity of pearlware. In the latter period whiteware comes to replace pearlware (Goodwin et al. 1983:186-187). A relative chronology for the various excavation proveniences at the site was developed using the ceramic data. The archeological investigations at Elmwood Plantation revealed a well stratified cultural sequence dating from the eighteenth and nineteenth centuries. Archeological, archival, and artifactual evidence indicate that a plantation great house and kitchen were constructed at the site during the very early-eighteenth century (Goodwin et al. 1983:256).

While the state of preservation of archeological deposits within the yard of the Elmwood great house was excellent, maintenance and improvements required by the operation of Destrehan Plantation as an historic museum has impacted much of the yard of this latter estate. Nonetheless, pockets of *in situ* midden, some dating to the eighteenth century, are preserved (Lamb 1983; Yakubik 1993). The first professional excavations conducted at Destrehan were undertaken to determine the nature and extent of subsurface deposits which could be impacted by earth-moving activities (Lamb 1983:7). The research design focused on the identification and location of outbuildings, including the kitchen, stables, and carriage house associated with the great house. In addition, an analysis of the different bricks used in the construction of the great house and other structures was performed (Lamb 1983:8).

Archeological testing consisted of probing, shovel testing, and excavation of test units (Lamb 1983:70). *In situ* deposits were found only in the north half of the west yard. Other areas such as the east yard and the south half of the west yard exhibited numerous artifacts, but these were highly mixed, indicating fill episodes (Lamb 1983:108).

The most innovated analysis undertaken at the site was the testing of a model for the dating of bricks developed for use in New Orleans' Vieux Carré. The model assumes that chronological bracketing of bricks can be established based on parameters of length, thickness, hardness, and color (Lamb 1983:119). Brick analysis involved the visual reconnaissance of the structures and features to determine remodeling and patching episodes. The areas were then divided into a one foot square grid. Random samples were then taken. Measurements were taken of all bricks of which at least 50% fell into the square. The number of samples taken was based on the size of the structure. Judgmental samples were taken where necessary. When dealing with subsurface features 5 bricks were judgmentally selected. All bricks in exposed foundations were examined (Lamb 1983:127). The results of the analysis supported the archival and historical evidence of the construction sequence at the plantation (Lamb 1983:169). From this, Lamb (1983:126, 171) postulated that, with some modifications, the model could be applied on a restricted regional basis perhaps as far west as the Bayou Teche region of Louisiana.

Subsequently, NRHP test excavations were undertaken at Destrehan by Earth Search, Inc. (ESI) (Yakubik 1993). This effort included 12.5 acres acquired by the River Road Historical Society in 1992, as well as the four acre yard surrounding the Destrehan great house. Intensive survey was performed to determine the location, nature, extent, and association of

cultural resources present on the property (Yakubik 1993:1). A detailed history of the plantation, based on archival and historic research, was included in the report.

Testing at the site consisted of shovel testing at 10 m intervals and the excavation of five 1 m x 1 m units and one 1 m x 2 m unit. These units were placed in high probability areas based on the results of the shovel testing (Yakubik 1993:55). Units were placed where probable structural remains were encountered in shovel tests; and where interesting patterns of artifacts were recovered (Yakubik 1993:56). Utilizing SURFER, the frequency distributions of artifacts from the shovel tests were examined to determine if any patterns could be discerned (Yakubik 1993:87). The heaviest concentrations of ceramics and other artifacts were located near the house (Yakubik 1993:89-90). Mean ceramic dates were estimated for the ceramics recovered in the excavation units (Yakubik 1993:97). Minimum vessel estimates were calculated, and economic scaling was undertaken (Yakubik 1993:98). The average ceramic index values indicated that the ceramics recovered from Destrehan represent normal utilitarian wares and not "fine china" that might be expected to be associated with groups of high socioeconomic status (Yakubik 1993:106).

The brick foundation wall for a small structure was encountered in one excavation unit. The dimensions of the structure (1.2 m x 4 m) were estimated by probing. The mean ceramic date for the unit was 1801.7; however, since this is not considered a residential structure, the ceramics may not date to the period of use (Yakubik 1993:66). The largest ceramic sample yielded a date of 1832.0 (Yakubik 1993:75). Finally, the two units placed to uncover suspected areas of eighteenth-century midden yielded dates of 1775.5 and 1792.5 (Yakubik 1993:70 and 78). These suggest the possibility that there are intact deposits which predate the great house preserved at the site (Yakubik 1993:121).

NRHP testing has also been conducted at Oak Alley Plantation (16SJ53) near Vacherie, Louisiana, by Archeologists Unlimited. As was the case with Lamb's (1983) investigations at Destrehan, these investigations were intended to test the location, nature, and extent of subsurface deposits associated with plantation dependency structures. Thus, testing was performed only in areas surrounding the existing great house. Previous investigations had recovered evidence of at least four structures associated with the great house (Boggess and Lovelly 1991:1). The research design consisted of a combination of extensive archival research and the archeological testing of features. Testing consisted of surface collection, shovel and auger tests, probing, excavation units, and shovel-excavated trenches.

The effort successfully identified features associated with the historic landscape. The location of the structures indicates that balance was important on the plantation. Symmetry was maintained in the numbers and sizes of structures on both the east and west sides of the great house. Feature 6, consisting of short foundation walls and associated brick piers, is interpreted as the carriage-house (Boggess and Lovelly 1991:45-46, 68). Feature 7 was identified as the remains of the wine cellar (Boggess and Lovelly 1991:46). Excavations at Feature 7 were intended to determine if the structure was countersunk and insulated to provide for cooling. While the structure was not countersunk, charcoal was packed between the inner and outer brick walls creating necessary insulation (Boggess and Lovelly 1991:47). The remains of a third structure (Feature 9) are interpreted as the kitchen and ironing rooms (Boggess and Lovelly 1991:68). This structure was located in the East Pattere or garden (Boggess and Lovelly 1991:48). Since it is not shown on the 1892 Mississippi River Commission Map, it probably was destroyed prior to this date (Boggess and Lovelly 1991:68).

Boggess and Lovelly (1991:62) stated that the small size of the artifact assemblages from the excavations and surface collections did not warrant sophisticated statistical analyses. Artifacts recovered included historic ceramics, glass, metal, construction debris, and miscella-

neous items. Interestingly, numerous prehistoric ceramics were also recovered; these were interpreted as deriving from fill episodes (Bogges and Lovelly 1991:75).

Possibly the most massive NRHP assessment effort related to Louisiana plantations was that undertaken by CEI on 1800 acres on the west bank of the Mississippi River in upper St. John the Baptist Parish, approximately 35 miles above New Orleans. The purpose of the survey was to locate, define and assess cultural resources on property belonging to Formosa Plastics Corporation of Louisiana. Results of this huge survey are presented in *Whitney Plantation: Archeology on the German Coast, St. John the Baptist Parish, Louisiana*.

CEI's project area has been occupied almost continuously since the eighteenth century (Hunter et al. 1991:1-2). Therefore, high, medium, and low probability zones were created to facilitate survey. Nineteen archeological sites within four historic habitations were recorded. Frequency distributions for different artifact classes were presented. The site dating technique consistently used for the project was mean ceramic dating. Additionally, mean dates were calculated on glass (color and thickness), pipe stems, and nails whenever possible. Because the purpose of the investigation was NRHP assessment, the focus of analyses was dating and interpreting cultural deposits.

The earliest eighteenth century occupation in the area was the Ambrose Haydel Habitation (16SJB42). Testing at the site consisted of surface collection and shovel testing. Numerous eighteenth- and early-nineteenth-century artifacts were collected, however, no structural features were noted. Creamware and pearlware were the most popular refined earthenwares (Hunter et al. 1991:6-47-50). Using Miller's 1980 indices for economic scaling, it was seen that less expensive wares decreased over time while more expensive ones increased (Hunter et al. 1991:6-51). The mean ceramic date for the site was 1798.56 with a range of 1770.45 to 1826.67. Analyses of other artifacts, such as metal, glass, and tobacco pipe stems, combined with the archival research, support the interpretation of this site as a mid-eighteenth-century occupation (Hunter et al. 1991:6-61).

The Nicholas Haydel Habitation (16SJB41) was located in a plowed field and was investigated by surface collecting. The site consists of a dense concentration of artifacts extending approximately 90 m x 50 m on the south side of LA Highway 18. A much smaller, associated scatter was noted on the north side of the highway (Hunter et al. 1991:7-7).

The majority of the artifacts recovered were ceramics (Hunter et al. 1991:7-10). The mean ceramic date was 1825.22 (1780.64 to 1869.0). This date is almost a decade too late in terms of the historical documentation on the site. When whitewares were removed from the sample, the resulting mean ceramic date was 1789.99 (1767.09 to 1808.89). Chronologically diagnostic glass, pipe stem, and nail data suggested that the site was occupied from 1769 to 1919, though probably not continuously (Hunter et al. 1991:7-32).

A total of six sites were discovered on Mialaret Plantation: the main building complex (16SJB9); the quarters (16SJB44); the sugar house complex (16SJB57); a tenant or overseer's house (16SJB45); and two refuse areas (16SJB46 and 16SJB54) (Hunter et al. 1991:8-1). The extant plantation was constructed over the remains of the original residence on the property. Architectural materials were scavenged from the wreckage of the original house and used in the new construction. The house, constructed after 1884, is of early French Creole style with Classical Greek Revival and Georgian influences (Hunter et al. 1991:8-22). Subsurface tests revealed undisturbed midden directly behind the house, as well as, older brick foundations and part of a brick floor from the original structure (Hunter et al. 1991:8-42, 58, and 60). The mean ceramic date for the midden was 1839.18 (1803.94 to 1874.42) (Hunter et al. 1991:8-43).

Two standing structures, intact midden, and archeological features are preserved at the Mialaret quarters (Hunter et al. 1991:8-48). Mean ceramic dating yielded date of 1865.79 (1823.15 to 1908.23), however, mean glass color dating produced a later date of 1927.95 (1912.77 to 1943.13). The two cabins were either moved to their current locations or were constructed on site after 1884 (Hunter et al. 1991:8-52).

Surface expression of the Mialaret sugar mill complex was a roughly rectangular, dense concentration of brick rubble. It measured approximately 170 m x 100 m (Hunter et al. 1991:8-56). The date range produced by mean ceramic dating was 1825.57 to 1884.93 (Hunter et al. 1991:8-57). While the mill was not destroyed by the tornado that hit the estate in 1884, it was apparently subsequently dismantled (Hunter et al. 1991:8-58).

The Whitney House is the unquestionable gem of the project area. At the Whitney House site (16SJB11) there are five standing structures which date to the late-eighteenth or early-nineteenth century (Hunter et al. 1991:9-35). These include the great house, a possible detached kitchen, two barns (or a barn and stable), and a *pigeonnier*. Archeological testing consisted of shovel tests at 10 m intervals. Artifact densities were much higher in shovel tests behind (south of) the great house, kitchen, and barn than on the north portion of the property (Hunter et al. 1991:9-37). Intact midden was encountered only on the south portion of the property. Pearlware and whiteware were the most common ceramic types recovered (Hunter et al. 1991:9-58-59). The majority of glass came from containers (Hunter et al. 1991:9-60). Combining the mean ceramic date and the mean glass color date, the date range for the site is 1788 to 1950 (Hunter et al. 1991:9-62). These dates correlated well with what is historically known about the site.

The Whitney Plantation sugar mill and quarters complex was designated 16SJB43. A portion of the quarters area was gridded into 69 10 m x 10 m collection units. Depending on surface visibility, artifacts were collected from the surface or in controlled shovel tests (Hunter et al. 1991:9-68). Frequency distributions showed that artifacts were concentrated in two areas (Hunter et al. 1991:9-69). Whitewares constituted the most popular ceramic type (Hunter et al. 1991:9-73). Other portions of the quarters area yielded few artifacts (Hunter et al. 1991:9-85). Mean ceramic and glass color dating did not yield useful dates for the quarters area. The greater amounts of later artifacts could be an indication of increased personal property after Emancipation (Hunter et al. 1991:9-89).

The sugar mill locale was designated Area D (Hunter et al. 1991:9-85). Two obvious features associated with the sugar mill are ponds (Hunter et al. 1991:9-86). The northern portion of the locale is covered with dense concentrations of brick rubble, bagasse, and coal, but very few domestic artifacts (Hunter et al. 1991:9-86). A single intact brick footing was uncovered in a shovel test (Hunter et al. 1991:9-87).

Based on cartographic information and archeological evidence, the Whitney quarters complex was moved at about the turn of the twentieth century. Site 16SJB51, which appears to date to the late-nineteenth or early-twentieth century, is interpreted as the new quarters locale. This site is just south of the highway, but still on the old plantation road (Hunter et al. 1991:9-89-93).

Other locales tested in the vicinity of Whitney were 16SJB47, 16SJB48, and 16SJB49, presumed to be tenant cabins (Hunter et al. 1991:9-96-102). Unfortunately, intact midden was not extant at these sites; and the artifact samples did not yield useful dates of occupation. The remains of a fairly large residence were found at 1SJB55. This site is interpreted as a secondary residence destroyed by the tornado in 1884 (Hunter et al. 1991:9-108). The midden at this site appears to have been disturbed by agricultural activities. Three other sites, 16SJB50, 16SJB53, and 16SJB56, also exhibited historic components. 16SJB56 includes remnants of a

standing French Creole cottage which may have been constructed during the late-eighteenth or early-nineteenth century (Hunter et al. 1991:11-4).

Interest in the archeology of African-American sites in and of themselves (as opposed to comparisons with planters and overseers, *cf.* Otto 1984) increased during the late-1980s, and with it came an increased interest in plantation economy. One of the first efforts within exclusively African-American contexts within Louisiana was the testing of the Magnolia Plantation (16NA295) slave quarters undertaken by CEI (Hahn and Wells 1991). The purpose of the investigation was to determine the date of construction and to document the subsurface construction techniques. The Magnolia Plantation quarters are unusual in that they are constructed entirely of brick. Subsurface investigations on the exterior of the structures were designed to test the hypothesis that the buildings originally had porches. Interior tests were planned to determine if the original floors of the structures were brick, wood, or dirt. In addition, the research design called for an examination of the living, social, and dietary conditions in different slave households on a single plantation. Thus, the delineation of disposal areas adjacent to each house was important to determine if these differed by structure (Hahn and Wells 1991:1 and 4). Unfortunately, disturbance due to renovations of the structures precluded the investigation of African-American lifeways.

The site was mapped, each structure measured, and a floor plan made of each house (Hahn and Wells 1991:4). Shovel testing occurred at 2 m intervals 1 m from each structure (Hahn and Wells 1991:42). Most of the artifacts were recovered from the rear and sides of the structures. The recent nature of the artifacts and the numerous construction debris indicated that substantial repairs had been made after a 1930 tornado impacted the structures. After shovel testing was completed, four houses were chosen for additional testing. These were chosen on their current condition and relatively minimal modifications, as well as the results of shovel testing (Hahn and Wells 1991:48).

Three 1 m x 1 m units were excavated at each house. Units were placed at the rear of the structures, inside the northern rooms, and adjacent to the northwestern entrances (Hahn and Wells 1991:48). Artifacts recovered from the units were also fairly recent in origin, indicating that renovations and modifications had been made to all the cabins. According to the historical record, there were wood floor porches on the structures. However, the existence of porches prior to 1939 could not be confirmed archeologically (Hahn and Wells 1991:57). While the area immediately adjacent to the cabins has been disturbed, it is likely that undisturbed deposits lie farther away from the structures (Hahn and Wells 1991:71).

While it also included examination of both the great house and industrial complex, ESI's NRHP testing at the Beka Plantation site (16OR90) permitted the examination of the quarters as a whole and more intensive excavations at one cabin site. Shovel tests in the vicinity of the great house were excavated at 20 m intervals. The cabin site was excavated at 5 m intervals. Artifact distributions from the shovel tests were used to locate the test excavation units (Yakubik and Franks 1992a:51-52).

Mean ceramic dates were calculated for each excavation unit, and economic scaling was also performed on the ceramics. Other artifact classes identified and analyzed were glass, nails, metal, bone, architectural debris, and miscellaneous items. Frequency distributions of artifacts from shovel tests were examined using SURFER to determine if there was discrete artifact patterning (Yakubik and Franks 1992a:76). Relatively few ceramics were recovered from the great house area, indicating that the grounds were kept fairly clean during occupation. By contrast, the distribution of antebellum ceramics corresponded well to the configuration of the antebellum quarters complex (Yakubik and Franks 1992a:76-77).

In the vicinity of the great house a brick floor post-dating 1850 was uncovered (Yakubik and Franks 1992a:86-88). Artifact assemblages from the great house area were consistent with the refuse from an affluent household (Yakubik and Franks 1992a:91). Four brick-lined wells were also present at the site. All of these had been at least partially infilled. Measurements of each well were taken, but no excavations were performed. Numerous other brick features were documented at the site.

A mounded area in the quarters complex was the site of 5 m interval shovel testing. A brick feature exposed on the surface of the mound appeared to be the base of a fireplace. Ceramics recovered from the shovel tests yielded a mean ceramic date of 1863.2, which is consistent with occupation both before and after Emancipation. By contrast, ceramics recovered from two cabin sites in the south and outside of the quarters complex suggest that occupation was during the late-nineteenth/early-twentieth century. Fewer artifacts were recovered from these cabin sites. This difference in artifact density may be due to differential disposal patterns by tenant farmers in areas outside of the quarters (Yakubik and Franks 1992a:128).

The first large-scale investigation of African-American lifeways on a Louisiana plantation was undertaken at Oakley Plantation in 1991 (Wilkie and Farnsworth 1992:34). Previous surveys (Woodiel 1980, 1985; Holland and Orser 1984; and Castille 1989, 1990) at Oakley had yielded small artifact assemblages and numerous deposits and features, however, the nature and extent of the archeological remains were never adequately defined (Wilkie and Farnsworth 1992:3). Wilkie and Farnsworth's (1992) report of investigations, along with Wilkie's (1994) dissertation on this research, examines African-American shared ethnic traditions and communal obligations within the context of plantation systems and interracial negotiations during the antebellum and postbellum periods.

Oakley was a large American-owned cotton plantation occupied from the early-nineteenth through the twentieth centuries. The research questions which could be addressed by the archeological remains at Oakley fall into two major groups. These are: (1) the changes in African-American society from the antebellum period to the early twentieth century; and (2) the comparison of Louisiana plantation systems to other plantation systems in the United States and the Caribbean (Wilkie and Farnsworth 1992:13). Specific questions related to first issue include:

1. What continuities or changes are evident in African-American diets through time?
2. Is there evidence of changes in economic status through time?
3. How does family organization and composition change through time?
4. Is there evidence of changing ideology?
5. Are there changes in the relative status of individuals within the society?
6. Is there evidence of African continuity?
7. What is the nature of Black-White relations at Oakley?
8. How do these two groups maintain their separate ethnic identities in the plantation context? (Wilkie and Farnsworth 1992:13-14).

Specific questions relating to the second research theme are:

1. How did African-American culture develop from slavery to the twentieth century in each region?
2. What were the development and structure of the economic systems of each region?
3. What was the impact of different political, economic, and trade systems on plantations in each region?
4. How the environment differentially affected the populations of the plantations in each region.
5. What is the nature of Black-White relations in each region?
6. How do these two groups maintain their separate ethnic identities in the plantation context of each region? (Wilkie and Farnsworth 1992:15-16).

These questions were addressed by a combination of archeological investigations and historic and archival research. Wilkie and Farnsworth's intent was to trace the development of African-American society in North America from its roots in antebellum slavery.

Wilkie and Farnsworth began with magnetometer survey (1992:76-77). A 20 m x 20 m grid was established and magnetometer readings were taken at 1 m intervals. Three main areas were covered during the survey. These were the kitchen garden, the plantation yard southwest of the kitchen, and the area around a standing shotgun cabin (Feature 30). The survey was intended to delineate structures and features associated with the plantation. Unfortunately, no new archeological features were defined on the basis of the magnetometer survey (Wilkie and Farnsworth 1992:94-95).

After completing the magnetometer survey, 31 features were tested (25 of these were previously identified by Holland and Orser 1984). Mechanically excavated post-holes were employed to locate new features. Shovel tests (50 cm x 50 cm) were excavated to locate archeological deposits which needed further testing and to explore the extent of these deposits. Finally, 1 m x 1 m units were dug to determine the integrity and significance of archeological features (Wilkie and Farnsworth 1992:96-98).

During artifact analysis, Wilkie and Farnsworth utilized a functional classificatory system they developed (Farnsworth and Wilkie Farnsworth 1991; Wilkie and Farnsworth 1992:104-106). The system recognizes that an artifact may have had multiple functions and that the functions are context-dependent. The system is divided into 14 categories or activity groups: food consumption; beverage consumption; food storage; beverage storage; health and hygiene; tobacco use; clothing and adornment; security and restraint; currency; household decor; domestic activities; non-domestic activities; communications; and ideology (Wilkie and Farnsworth 1992:105). Artifacts were classified according to their last functional use. In addition, where the samples were large enough, minimum numbers of items (usually vessels) were calculated (Wilkie and Farnsworth 1992:103).

Of six significant localities or features identified during testing, one represented the remains of an unidentified structure which may date to the earliest period of occupation at the plantation (Wilkie and Farnsworth 1992:109-179). The other five localities were midden deposits associated with the main house, the kitchen, and a twentieth century African-American tenant cabin (Wilkie and Farnsworth 1992:204, 207-210). Midden deposits were found to be concentrated behind the structures. Additional locales that were identified included the remains of the Freeman (plantation cook) house (Wilkie and Farnsworth 1992:193-201). Test units revealed substantial archeological deposits including a brick pier, beam, and thick early-nineteenth to twentieth century midden deposits. The Freeman family occupied the house as

early as the 1880s as the matriarch, Silvia, is listed as a domestic worker in the plantation ledger of 1889 (Wilkie and Farnsworth 1992:194).

This research shows that a rich African-American culture thrived on the plantation during the nineteenth and early-twentieth centuries. While almost every aspect of daily life was tied to the Euro-American plantation, the African-Americans maintained a community distinct from their Euro-American employers and neighbors (Wilkie and Farnsworth 1992:219).

As was the case with Wilkie and Farnsworth's (1992) research, Babson (1989) investigated both great house and quarters contexts during NRHP testing at Ashland-Belle Plantation (16AN26), but his research interest was clearly the latter. The project sought to recover data on daily life, spatial organization, and social hierarchy at the plantation and to incorporate information on the site into a broader database on the plantation economies of Louisiana in general (Babson 1989:1-12).

Research goals were to test the site of a two-story outbuilding of unknown function located northeast of the great house, and to locate, test and distinguish the pre-1884 and the 1911 slave/workers quarters (Babson 1989:61-62). Excavations recovered a variety of sherds, buttons, hardware, window glass, and metal tools and utensils dating to the second half of the nineteenth century. Testing of the building augmented architectural information about the structure and indicated that the exterior walls of the outbuilding were built on a brick spreader. Excavations uncovered a portion of the builder's trench associated with the wall on the east side of the building but provided no diagnostic artifacts related to the date of first construction. A late-nineteenth-century brick (circa 1890-1920) manufactured by the Belle Helene Planting and Manufacturing Company was recovered from just outside the structure. In general, testing of the outbuilding determined that its foundations retained most of their integrity but failed to provide definitive information about the building's function. The small amounts of animal bone recovered suggest the area was kept clear of refuse; there was, however, no evidence to corroborate oral traditions of its use as a kitchen (Babson 1989:79-80).

Excavations in the slave quarters tested the locations of five cabins (Babson 1989:81). Units were paired in order to investigate areas both within and outside structures. Excavations confirmed that a series of brick heaps evident on the surface in the northeastern section of the grounds marked the location of the workers quarters shown on a 1911 map of the estate (Babson 1989:107). No structural evidence was found in the area where a 1884 historic map illustrated the quarters, but domestic refuse indicated an occupation dating to approximately 1850-1880.

Three cabin sites shown on the 1911 map were tested. Two consisted of brick piers arranged in a rectangle and a central heap of bricks marking the remains of the fireplace and chimney. The third was represented only by a chimney fall. Materials were predominantly late-nineteenth century underlain by a thinner zone from a mid-nineteenth century occupation. Recovery of a crucifix, possible rosary beads, and a cowrie shell may reflect both an African-American and a later Sicilian immigrant occupation. The cabin represented by only a chimney fall yielded an assortment of broken toys, including a doll's arm, fragments of toy plates, and a marble. Babson noted a general lack of window glass from these cabins sites. This, in addition to artifactual evidence, helped confirm these were the cabins shown on the 1911 map, as an informant reported that cabins in the quarter lacked glass windows (Babson 1989:103).

The area thought to be occupied by the cabins shown on the 1884 map was characterized only by low but perceptible rises in elevation. Four units were excavated at this location but revealed no evidence for structures. However, the area contained abundant evidence for a domestic occupation in the form of discarded household materials and animal bone. The arti-

facts recovered predominantly pre-dated 1884. A nearby well also indicated use of the land, and Babson recovered large amounts of slag, suggesting that there may have been a blacksmith's forge in the vicinity (Babson 1989:106). The first cabin locus examined had a mean ceramic date of 1874, a glass thickness date of 1861, and a *terminus post quem* for amethyst solarized glass (1880). The second had a mean ceramic date of 1871 and a *terminus post quem* of 1880.

On the whole, much of what was recovered by the 1989 project reflected a postbellum and late-nineteenth-century occupation at Ashland-Belle Helene, with sporadic evidence for the antebellum occupation. This result was confirmed when ESI subsequently undertook archeological data recovery within the quarters complex at Ashland-Belle Helene Plantation (Yakubik et al. 1994). Investigations were undertaken to mitigate adverse impacts to the site by planned development for the Shell Chemical Company.

Investigations by ESI were designed to address many of the remaining issues concerning the occupations at Ashland-Belle Helene. Fieldwork consisted of a Phase I investigation consisting of shovel testing the entire 102-acre property at gridded 30 m intervals; a Phase II investigation consisting of shovel testing a portion of the property corresponding to the former quarters and industrial complexes at gridded 15 m intervals; data recovery in the quarters complex, consisting of excavations at the sites of two cabins and archeological monitoring; and data recovery at the sugar house (Yakubik et al. 1994:1-1).

Data from Phase I and Phase II investigations were utilized to select the sites of two cabins for excavation. It was hoped that one cabin with exclusively antebellum deposits and a second with exclusively postbellum deposits would be identified. This was not the case; and two cabins with relatively strong antebellum components, relatively rich deposits, and a high potential for features were selected for intensive investigations (Yakubik et al. 1994:1-1).

The research issues identified focused on the characterization of the lifeways of Ashland-Belle Helene's African-American population. As noted above, it was observed both during Babson's (1989) investigations and during ESI's survey that artifactual evidence of the pre-Emancipation component was scarce within the Ashland quarters. By contrast, the antebellum assemblages from the quarters at both Beka Plantation (16OR90) (Yakubik and Franks 1992a) and Nina Plantation (16PC62) (Yakubik 1994, see below) were relatively rich. The differences between the collections from the quarters complexes at these three estates suggest that there was considerable variability in the supplies provided by masters to their slaves. In the case of Ashland, the material paucity was interpreted as the result of extreme paternalistic control by the planter, Duncan Kenner. Both material and historical evidence corroborated that Kenner disliked his slaves having personal possessions and spending money, and his control of his workers' market access continued past Emancipation through the Ashland Plantation store (Yakubik et al 1994).

Unfortunately, pre- and post-Emancipation components at Ashland-Belle Helene could not be separated for analytical purposes other than on a gross level (e.g., all ceramics predating classic ironstone are antebellum, and all ceramics postdating classic ironstone are postbellum). This situation is not atypical, particularly on sugar estates, where the antebellum quarters complex continued to be occupied by freedmen wage laborers after Emancipation. Therefore, the remains from the two cabin sites selected for excavation were compared to each other in an effort to characterize variability on the household level (Yakubik et al. 1994:1-3).

Trenches were excavated in each yard. These trenches intersected at the center of each cabin site, i.e., the mound covering the base of the cabin's chimney. Additional 1 x 1 m units were judgmentally placed to further explore features within the house and yard. A total of 89 units were excavated at each cabin site. As part of data recovery, monitoring of construction

was also undertaken. This monitoring provided data on plantation layout and organization that could not be obtained from excavations at the two cabin sites (Yakubik et al. 1994:1-4).

Artifacts recovered from Cabin 1 included architectural debris, coal, charcoal, ceramics, glass, nails and metal, bone, and personal items. Notable among the personal items were numerous smoking pipe fragments, doll fragments, and beads (Yakubik et al. 1994:8-4). Mean ceramic dates from Cabin 1 were 1864.5 for the lower stratum, and 1869 for the upper stratum (Yakubik et al. 1994:8-6 and 15). Numerous features were associated with Cabin 1 including the base on an enclosed double fireplace chimney, remnants of several piers, possible post holes, and a brick rubble mud step (Yakubik et al. 1994:8-15).

Artifacts recovered from Cabin 2 were similar to Cabin 1, but there was a lower overall artifact density. Mean ceramic dates were 1863 for the upper stratum and 1867 for the upper stratum (Yakubik et al. 1994:8-85 and 99). Features at Cabin 2 included a chimney base, several pier locales, a post hole, and a mud step (Yakubik et al. 1994:8-99). Interestingly, the remains from the two cabins were nearly identical in terms of percentages of artifact functional types and percentages of vessel forms. This again was interpreted as evidence of the planter's control.

Examination of faunal remains from the cabins and comparison of these to collections from other Louisiana plantation sites suggested that by the end of the antebellum, meats provided to plantation workers were fairly standardized. In particular, the remains from Ashland-Belle Helene and from the Beka Plantation quarters, which were contemporaneously occupied, were virtually identical and emphasized domesticated animals. By contrast, faunal remains from the late-eighteenth/early-nineteenth-century quarters at Orange Grove Plantation showed a much greater reliance on wild species (Yakubik et al. 1994).

Despite Kenner's paternalistic control, it was apparent that the quarters afforded a haven for the maintenance of the African-American workers' social and ideological systems. In particular, artifacts were identified in the two cabin collections that might reflect the retention and practice of African belief systems. These items, including beads, buttons, smoothed stones, pierced coins, and shells, were all discussed in terms of their possible traditional meanings beyond their Euro-American assigned functions.

Archeological monitoring of construction was simultaneous with the excavations at Cabins 1 and 2. Monitoring confirmed that almost all structural remains and artifact concentrations at the Ashland-Belle Helene site were located within the strip of land between Ashland Road and a large plantation ditch. This parcel contains the great house and adjacent outbuildings near River Road (outside the impact area), the quarters farther east, the sugar house complex at the eastern end of the present property, and the foundations of an overseer's house and miscellaneous outbuildings between the quarters area and the sugar house (Yakubik et al. 1994:9-1). Features recorded during monitoring included numerous chimney bases, artifact concentrations, brick foundations, and sugar house machinery. A total of 18 of the former cabin sites were documented. Other structures included the overseer's house and a possible blacksmith's shop. As was the case at Beka Plantation, late-nineteenth-century residential sites were identified outside of the quarters complex; these were interpreted the habitations of wage laborers who refused to continue to live under the same conditions they had during slavery. Archeological monitoring also enabled a diachronic examination of plantation layout (Yakubik et al. 1994).

Subsequent to ESI's investigations at Ashland-Belle Helene, R. Christopher Goodwin and Associates, Inc. (RCG&A), conducted a massive data recovery effort at Nina Plantation (1PC62). NRHP test excavations had previously been conducted at the site by ESI during survey of the Red Store and Grand Bay Revetements along the west bank of the Mississippi

River in Pointe Coupee and West Baton Rouge Parishes. The archeological remains at Nina Plantation represent the quarters, great house, and sugar house complexes (Yakubik 1994:373). A total of 11 backhoe trenches were excavated in the great house and quarters areas. (Yakubik 1994:374). Although only one culture-bearing stratum was encountered, artifacts were stratified chronologically. Ceramics recovered from this portion of the plantation suggest initial occupation was subsequent to 1822 (Yakubik 1994:383). Features uncovered by the trenching were hand excavated. Features encountered included post molds, charcoal and ash lenses, concentrations of architectural debris, brick piers, and possible wall footings (Yakubik 1994:391, 401, and 406).

An analysis of the minimum number of vessels represented by the Nina great house and quarters complex ceramic assemblages was performed. Economic scaling based on Miller (1991) indicated that the great house had higher value bowls, while the quarters complex had higher value cups and saucers. This may be due to the use by African-American inhabitants of outmoded or damaged vessels derived from the great house. Alternatively, post-Emancipation occupants may have had a preference for decorated tablewares and tea sets (Yakubik 1994:429).

Archeological mitigation by RCG&A was confined to the main house complex and outbuildings complex. Excavations were not undertaken in quarters because were outside the area of planned construction. Investigations yielded numerous artifacts and features associated with planters and the laborers living and working on this sugar and cotton plantation. Investigations and analyses were designed to address specific research issues such as planter and slave diets, the spatial arrangement of plantation structures, and the temporal associations of structures and features (Markell et al. 1996:4).

Field investigations at Nina Plantation included mechanical stripping of overburden, division of the project area into 30 m x 30 m blocks (designated A-I), magnetometer survey at two meter intervals, excavation of 17 backhoe trenches, and hand-excavation of 170 1 m x 1 m units (Markell et al. 1996:113-118). At least two stratigraphically separate middens were found in association with the main house and outbuildings (Markell et al. 1996:3). The earliest midden stratum was capped by a thick alluvial deposit representing the devastating flood of 1851. Directly above this deposit was the midden stratum which primarily represented the postbellum occupations at the site. While the flood episode does not exactly separate the antebellum from the postbellum contexts, it does approximate the shift of ownership of the property from the French Creole family to an American (Markell et al. 1996:400). The presence of the alluvial deposit greatly facilitated the interpretation of construction sequences and the spatial and temporal associations of the various structures and features uncovered at the site.

The remains of the main house complex were uncovered. This complex consisted of the core structure, the north and south wings, and the north and south cistern bases. The core and the south wing were apparently constructed contemporaneously, though the south wing was originally a separate structure. The Jarreau family had these structures built in the 1820s. The north and south cistern bases were placed shortly after occupation had begun in the main house. The north wing was constructed after the flood of 1851 and was most likely part of renovations undertaken by new owner Allen (Markell et al. 1996:214-215, 255).

The remains of two structures (Structure 1 and Structure 2) which were part of an outbuildings complex shown on 1880-1881, 1883 Mississippi River Commission charts were uncovered (Markell et al. 1996:186, 215). Features encountered in Structure 1 included the base of a large H-shaped chimney foundation constructed over the remains of an earlier chimney and hearth made of wood and clay. Both Structure 1 and 2 were built using ground-laid sills and post-in-ground techniques (Markell et al. 1996:215). Apparently they served as resi-

dences for domestic labor. Structure 1 also served as the dependency kitchen for the plantation (Markell et al. 1996:217).

The outbuildings complex was about 30 m south of the main house (Markell et al. 1996:255). Structure 1 originally had a dirt floor, and a wood and clay/daub chimney with a clay hearth. Stratigraphy in the area indicates that this building was probably constructed at about the same time as the core of the main house and the south wing. Later changes to Structure 1 included the replacement of the original chimney by a substantial brick chimney and the addition of a wooden floor (Markell et al. 1996:257-272).

The remains of Structure 2 were quite ephemeral due to erosion and to construction of a modern levee and drainage ditches. Apparently the structure was composed of 2 rooms. There was a central N/S partition wall constructed using *piquette en terre* techniques. There was no evidence of a chimney; however, a fire pit was uncovered in the presumed center of the building. Structure 2 appears to have been a residence occupied contemporaneously with Structure 1 (Markell et al. 1996:274-281).

One of the major artifact types recovered from Nina Plantation was a variety of historic ceramics. Ceramics were distributed across the whole site, however, there was a notable concentration of early period ceramics in the core of the main house in Block D. In the late period, there was a noticeable change in the distributional pattern of ceramic types which suggests a change in activity areas at the site (Markell et al. 1996:322).

The ceramics were used in a comparative examination of socio-economic status at Nina Plantation, as well as to elucidate patterns in foodways and diet. Functional analyses examine behavioral patterns and activity areas. Analyses conducted using ceramics include the calculation of type frequencies, minimum vessel counts, mean ceramic dating, archeological seriation, and economic scaling.

Inter-block comparisons of ceramic type frequencies showed that the outbuildings complex exhibited the highest frequencies of whitewares, while the main house complex had higher frequencies of pearlware and porcelain than did the outbuildings (Markell et al. 1996:331-337). In comparing the ceramic frequencies based on time period, there was greater variation between the early and late periods in the main house than in the outbuildings.

In order to clarify the occupational sequence and to test the hypothetical date ranges established for the site two analytical methods, mean ceramic dating and seriation were employed. Because it is a multiple component site, the MCD was not expected to be ideal at Nina Plantation. The mean date for the site overall was 1855.88. Mean dates for each component were less useful: early period - 1851.23, late period - 1856.94 (Markell et al. 1996:339-340). The mid-nineteenth-century dates could also be due to the fact that the dates of manufacture for the recovered ceramics span the nineteenth century. Results of ceramic seriation agreed with the general chronological sequence established for the site (Markell et al. 1996:341).

Economic scaling was used to ascertain the relative social or economic status of the occupants of Nina Plantation (Markell et al. 1996:343). The averaged index values for the vessels at Nina were compared to those from Beka and Ashland-Belle Helene Plantations. Results of this comparison indicated that the occupants at Nina had a lower economic investment in their ceramics than did the occupants of Beka or Ashland-Belle Helene. Within Nina itself, the main house complex showed higher index values than the outbuildings complex did (Markell et al. 1996:348).

Frequencies of vessel form were also calculated for the ceramics at Nina Plantation. Intra-site comparisons indicated that the relative proportions of vessel types changed tempo-

rally between the main house and outbuildings complexes. Chi-Square tests of independence found the differences to be statistically significant rather than random (Markell et al. 1996:352). The data showed significant differences in the proportions of bowls and cups between the two complexes. The difference was more pronounced in the early period. Distributional differences in vessel forms appears to be quite minimal during the later period. The differences in vessel form distribution may be due to the change in plantation ownership, to the possible relocation of the kitchen, or to emancipation of the slave labor (Markell et al. 1996:358).

As seen in the forgoing, plantation archeology is moving away from its past emphasis on the material wealth of the planter class. Instead, our understanding has become dialectical, reflecting the plantation as a dynamic economic and social system with a variety of cultural entities working in opposition. These contrasts may be seen in the schematic layout of the plantation, in the architectural design of the buildings, and the material culture of inhabitants. With this in mind, the following presents a data recovery plan for North Bend Plantation, sites 16SMY66 and 16SMY132.

Research Issue 1. Power Relations on the Twentieth-Century Sugar Plantation

Any discussion of socio-economic development in the southern United States must consider social inequality (Ferguson 1991, 1992; McGuire 1992; Paynter 1982, 1988:407-433; Paynter and McGuire 1991). Research focusing on social inequality is often posed theoretically as "power relations" (Paynter and McGuire 1991:1-4). Recent studies have described power in terms of dominance and resistance relations. Simply put, we are investigating "the means people use to exercise power over one another and concomitantly resist and succumb to these entreaties and pressure" (Paynter and McGuire 1991:4). Most research concerning social inequality, to date, concentrates on the dominant group's tactics and strategies associated with power (Paynter and McGuire 1991:16) and to a much lesser degree the tactics and strategies employed by those resisting domination (Ferguson 1991, 1992, 1996; Orser 1991; Scott 1985).

Most models incorporating power relations and social inequality hold that the dominant group (e.g. elite, planter) employ strategies which create and maintain social inequality, strengthen political obligations, and fund new institutions of control (Brumfield and Earle 1987; D'Altroy and Earle 1985; Friedman and Rowlands 1978:219; Gibbon 1989; Leone 1971, 1984, 1986, 1987, 1989; Pauketat 1994; Wolf 1982). The ability to transform relations between producers and goods by the dominant group is a primary factor in socio-economic relations. This power allows the dominant group to create the new control institutions while concurrently extending their control into the economic arena by patronizing certain classes of goods associated with social prestige or wealth. Fundamental to this treatment of ideology is the reliance upon Louis Althusser's (1971:127-186) Dominant Ideology Thesis. Althusser's thesis contends that the ideologies of the dominant groups in society are imposed on subdominant groups.

Opposition to the use of the Dominant Ideology Thesis contends that the thesis denies the subdominant groups the ability to formulate their own ideologies. The end result is a model of relationships which tends to ignore the very existence of a subdominant culture or ideology (Abercrombie et al. 1980; Beaudry et al. 1996:278, 12; Hodder 1986:61-70; Miller 1987:162-163; McGuire 1988:439-440). Bennett et al. (1981, 1986), Beaudry et al. (1996:280), and Hargreaves (1989) suggest this problem may be alleviated, or at least approached in a different manner, by utilizing the Italian Marxist Antonio Gramsci's (1971) concept of cultural hegemony in conjunction with a class-based model of relationships. According to Gramsci, members of social classes put forth competing ideologies, centered around what they perceive to be their own interests. Class relationships consist of the negotiation of

these ideologies in the cultural arena. Symbols may be adopted and manipulated by the members of different groups, in a process through which each group "seeks to negotiate opposing class cultures onto a cultural and ideological terrain which wins for it a position of leadership" (Bennett 1986:xv). Therefore, hegemony is an active prevailing consciousness (ideology) negotiated among the different interest groups and internalized/accepted to varying degrees by members of the interest groups.

We agree, in principle, with the use of the concept of cultural hegemony. But our agreement must be qualified. Research focusing upon Louisiana sugar plantations clearly indicates two economic forms exist: the antebellum slave-based plantation and the wage-based postbellum plantation. Class relations on these two types of plantations should be different, at least qualitatively. Therefore, we suggest that two concepts or definitions of power be incorporated into the concept of cultural hegemony. Power, theoretically, may be either the ability of an individual to carry out his own will despite resistance (*sensu* Weber 1978:926-940) or the capability to intervene in certain circumstances to alter or transform events in some way (*sensu* Giddens 1987:7; Giddens and Held 1982:60-86). These two perspectives on power have been related in subsequent research as power over [Weber] and power to [Giddens] (Miller and Tilley 1984:5-8; Cobb 1993:43-100; Marquardt 1991:8-9; Paynter 1989:369-373; Paynter and McGuire 1991:6). The Weberian definition of power (power over) would correspond most closely to the situation found on the slave-based economy of the antebellum plantation, while Giddens concept (power to) would be most likely to occur on the wage-based postbellum plantation.

Study Topics:

1) How does the landscape reflect the power relations of Planter and Wage Laborer?

Inequality in complex societies may be manifest by differences in settlement patterns. For example, relative sizes and placement of domiciliary structures may indicate social differentiation and inequality. The construction of monumental architecture (the great house), the manipulation of landscapes (arrangement of structures) symbolize, whether consciously or unconsciously, the dominant/elite/planter ideology, and thereby serve to control and manipulate the means of production (Orser 1988; Leone 1972; Miller 1980: 1-40; Otto 1977:91-118, 1984; Rose and Rathbun 1987:177; Spencer-Wood 1987). Social reproduction of ideologies representing those resisting domination may include overt forms such as burning barns, feigning ignorance, murder, revolutions, strikes, and sabotage (Aptheker 1974; Genovese 1976:585-660; Paynter 1989:380-386; Paynter and McGuire 1991; Wolf 1982; Wood 1974:285-326), as well as more subtle, less conscious forms of resistance, such as the use of traditional building forms or practices, or the organization and use of space within a yard lot.

Orser's (1988) Marxist-oriented study of Millwood Plantation, South Carolina, focuses upon postbellum laborers of this estate. His research indicates that the spatial organization at Millwood changed through time and conforms, in some instances, to the model presented by Merle Prunty (1955). Prunty's model suggests that the antebellum plantation would have a nucleated organization which would transform through time to a dispersed spatial pattern during the postbellum era. Moreover, slave quarters would tend to be clustered during the antebellum period and followed by the squad arrangement after 1865. The squad arrangement is believed to represent semiautonomous groups of peer workers who were formerly slaves and wage laborers. Each squad was composed of an extended family and each group would occupy its own settlement cluster close to its fields. Sometime after 1875, the widely dispersed tenant/sharecropper pattern became the dominant arrangement.

Orser's research (1996:392-415) indicates that Millwood Plantation spatial organization did change through time, but the settlement nucleus continued to be used until at least the turn of

the twentieth century. It appears, however, that the settlement nucleus retained its form but not its function through time. To explain, the settlement nucleus, especially the slave cabins, continued to be inhabited by either sharecroppers or wage laborers until 1900 which preserved its form (rows of houses) but not its function (controlling slaves). Also, meaningful internal spatial divisions were noted in the settlement nucleus at the inter-structure level and is related to or characterized by task-specific structures. The spatial separation of living quarters by different ethnic and/or racial groups is a function primarily related to the division of labor rather than race.

As we have seen, the dominance of wage labor on postbellum sugar plantations generally resulted in continued use of the antebellum quarters, despite the occasional establishment of habitations outside the established complex (Yakubik and Franks 1992a, Yakubik et al. 1994). At North Bend Plantation, the quarters under consideration here were built during the early-twentieth century on the nucleated antebellum pattern (Figure 5). Archeological examination of these quarters combined with historical research may help to elucidate the socio-economic interplay between planter and laborer. Within this framework, however, it is important to identify organizational differences that may be the result of technological change, i.e., those that are a function of the innovations introduced in sugar agriculture during the late-nineteenth and early-twentieth centuries. Specific questions to be addressed include:

- a) were there structural variations in the cabins erected at the North Bend quarters, and can these be attributed to individual preference/economics/status of the occupants?
- b) how was space utilized within individual house lots?
- c) can improvement in quarters housing standards be demonstrated diachronically, and can these be related to economic forces such as sugar prices, wage rates, and worker availability?
- d) does Bayou Sale represent an area where previous models of sugar plantation layout (e.g., Rehder 1971) do not apply?
- e) is layout at North Bend Plantation typical of other plantations in the Bayou Sale vicinity? If not, to what extent do technological differences of the early-twentieth-century explain these differences?
- f) can a general model of plantation layout change be formulated for the period 1865-1910 and applied to North Bend Plantation? What elements in this model are necessitated by function/technology?

2) Is there evidence in the laborers' material assemblages of resistance to power through the retention and practice of traditional belief systems?

Until relatively recently, archeologists searched for material evidence of African tradition slave contexts, only to find that assemblages from African-American contexts were, with few exceptions, disappointingly European-American in appearance. Given that planters largely controlled the commodities acquired by slaves, this is not surprising. Similarly, through the plantation store, many planters had the opportunity to continue this control after Emancipation. Nevertheless, retention of African belief systems is demonstrable, as is the adaptation of European material goods to traditional practices (Herskovits 1990). Increasingly, archeologists are finding that while the vast majority of artifacts on slave and freedmen sites are European-American, the usage of some of these items is African-American, as can be demonstrated by

the frequencies and contexts of their occurrence (Brown and Cooper 1990; Ferguson 1992; Klingelhofer 1987; Wilkie 1994, 1996). Moreover, these distinctions are observable in African American contexts dating to the late-nineteenth and early twentieth centuries, and they are not merely restricted to the pre-Emancipation and immediate post-Emancipation periods (Brown and Cooper 1990; Wilkie 1994; Wilkie and Farnsworth 1992; Yakubik et al. 1994).

African cultural beliefs and practices were not forgotten under American slavery or following Emancipation (Herskovits 1990; Joyner 1984). Although African-Americans may not have had access to objects or materials used for ritual practices in Africa, they were given some access to objects and materials that could have been used or reworked and then used to help maintain their belief system (Brown and Cooper 1990, Orser 1992). These items could have been used in ritual practices, despite pressures from European-Americans to erase all African cultural beliefs and heritage. Similarly, utilizing common European-American objects could serve to camouflage forbidden ritual activity (Brown and Cooper 1990:17). Consequently, the function of artifacts found at African-American sites can differ from those understood by European-American culture.

Retention of traditional beliefs and behaviors rooted in African belief systems can be seen as a form of resistance to power (Howson 1990). Then too, material culture may express intra-group corporateness when relationships are under stress (Shackel 1992; Hodder 1979, 1982). Specific questions related to this study topic include;

- a) Do the laborers' assemblages include items previously identified as related to African belief systems (e.g., shells, smoothed stones, buttons, beads)?
- b) Do Euro-American artifacts occur together in contexts suggesting the practice of traditional behaviors, that is, are they serving a different function than that for which they were created?
- c) How does the documentary and/or oral historical record elucidate the practice of traditional beliefs?

3) How is the economic relationship of Planter and Wage Laborer manifested in the material culture of the latter? Was there a plantation store at North Bend, and did the Planter restrict their purchases to this locale? Did the laborers exhibit resistance by purchasing goods at a variety of locales (at other plantation stores, from traveling salesmen, from stores in the town of Franklin), or were they paid in scrip that could only be used on the plantation?

The use of material culture may be seen as a response to and a defining characteristic of inequality. In addition, differences in material culture may indicate inequality not only between dominant and subdominant groups, but also indicate social differentiation within groups (Geismar 1982; Orser 1988; Paynter 1982; Singleton 1985). Both conscious and unconscious forms of resistance would include and be manifest in the content and structure of daily artifact use (Ferguson 1991:28-39, 1996:260-271; Beaudry et al. 1996:279; Scott 1985). Finally, material culture can be used to create, enforce, and reinforce behaviors as well as maintain social boundaries (Shackel 1994:8).

McDonald (1993) has found that during the antebellum period, slaves had a degree of economic autonomy, and that the plantation had an internal economy that served as the root of the postbellum plantation store. This "economic autonomy" must not be overstated, since during the antebellum period the planter held ultimate control (cf. McDonald 1993:152). For example, at Ashland Plantation, Planter Duncan Kenner allowed his slaves to raise chickens for sale, but he himself bought the chickens and sold them at a profit (Blassingame 1977:393). He "didn't want [the slaves] to have too much" (Blassingame 1977:393), and this was observed in

the paucity of the material assemblages in both antebellum and postbellum contexts. He could exert this control because the plantation store and the form of payment (scrip, credit, or cash) were major determinants in the market access of the postbellum laborer (Yakubik et al. 1994).

The historical record suggests that by the twentieth century, wage laborers on sugar plantations did have some greater degree of autonomy than was the case during the immediate postbellum, primarily as a result of labor shortages. If the individual did not like the terms, he did not have to sign the contract. If this is in fact the case, it should be reflected in the material record at North Bend Plantation.

Specific questions to be addressed include:

- a) Does the variability of the material assemblages of different households in the quarters suggest free market access by the inhabitants?
- b) Does the variability of the material assemblages of different households in the quarters suggest within group social differentiation?
- c) do historical sources provide further information on how cane plantation workers obtained access to consumer goods?

Research Issue 1 addresses the themes of "Plantation Archeology" and "Euro-American Influence on the Landscape" identified in Louisiana's *Comprehensive Archaeological Plan* (Smith et al. 1983:279-280).

Research Issue 2. Consumer Behavior of Wage Laborers on a Twentieth-Century Plantation.

Study Topics:

1) How did the laborers at North Bend Plantation allocate their wages in terms of material goods and subsistence items? What social, economic, and/or political factors influenced their purchasing decisions? How were their purchasing decisions limited by market access? What was the role of woman in the household economy in terms of making purchasing decision for the family? How were goods marketed to the laborers?

As the above Study Topics suggest, the issues of consumer behavior and power relations overlap in the consideration of the acquisition of material culture. For example, the purchasing power of the newly-emancipated Freedman might be manifest more and new goods. S/he might make the decision to acquire greatly varied effects as a rejection of a conservatism regarding goods inherent in the old order of slavery. Ironically, this desire for new material might have the net effect of furthering the planter's control and the Freedman's ties to the plantation if purchases are restricted to those made in the plantation store.

Further, if objects are vested with meaning at the time of purchase (Cook et al. 1996:55), would Freedmen be motivated to emulate planters'/whites' use of material culture, or are they utilizing goods in unique ways that strengthen within group social identification and which excludes whites (*viz.* Lucas and Shackel 1994)? We lack data on the means by which consumerism was conveyed to Freedmen, and consequently, on how shopping is reflective of their cultural values and cultural identity (Cook et al. 1996). Then too, where shopping was done is equally important; shopping off the plantation could well be a political statement (*cf.* Orser 1992). Yet this choice might be limited by distance to market and lack of transportation (*viz.* Holland 1990). While research has indicated that in general, market access is not more limit-

ing than actual buying power, this might not be the case in plantation settings (Baugher and Venables 1987; Spencer-Wood and Heberling 1987; Farnsworth 1996).

The question of who was doing the shopping, and therefore making purchasing decisions, is also interesting. As noted above, women largely ceased to serve as full-time laborers in the field during Reconstruction. Technological innovations, such as the Mallon cultivator, the disc cultivator, the disc harrow, and the drag bar, reduced the labor requirements of cane cultivation. While women continued to work seasonally or in other capacities (e.g., washwomen, seamstresses), we may assume that their sphere of operation was increasingly relegated to the household. Within Euro-American households, the expansion of the woman's role as "housewife" also increased her power in purchasing decisions, and this is reflected in material culture through tableware, medicine use, and childcare items (Klein 1991; Larsen 1994). This issue has not been investigated for the context of African-American wage laborer households on the plantation. It is possible, since the African-American woman likely brought more cash into the household than did the contemporary white middle-class housewife, that the former may have had even more discretionary power over purchases.

Many variables, including household composition, household life cycle, and income strategy, effect consumer choices (LeeDecker et al. 1987; LeeDecker 1991; Henry 1987; Klein 1991), but because of the lack of documentary evidence regarding the nature of the households within the North Bend quarters complex, these cannot be considered. Then too, only a portion of material culture, objects that were lost or discarded, occurs in the archeological record, so we lack data on those objects which have been conserved (Schiffer 1987; Henry 1991). Nonetheless, through both archeological and documentary data, it should be possible to characterize the expenditures of an African-American wage-based household in the early twentieth century. Specific questions to be addressed include:

- a) how do the material assemblages from the North Bend quarters compare to each other in terms of quality, quantity, and variety?
- b) how do the material assemblages from the North Bend quarters compare to those from nineteenth-century plantation quarters on other plantations in terms of quality, quantity, and variety?
- c) do makers' marks or other identifiers on artifacts suggest a regional or inter-regional focus of economic activities?
- d) do the assemblages indicate stable market access, or do the sources of material goods change over time?
- e) do historical sources provide data to indicate how wage rates of laborers related to other aspects of material culture?
- f) what data are available regarding the marketing of goods to African-American laborers?

2) *How is consumer behavior reflected in the diet of the population at the North Bend Plantation? How does it compare with each other and with similar populations elsewhere in Louisiana? If there are differences, are these related to socio-economic position, personal choice, and/or market access? Are there differences among individual households in the quarters? What is the nature and the reasons for these differences?*

A small, but surprisingly diverse faunal assemblage from 16SMY66 has been analyzed in Chapter 7 of this report. Both domestic and wild species are present in the sample. However,

because of the small size of the faunal assemblage and the limited archeological context, the sample cannot be taken as representative of the diverse activities at the site. Increasing the sample size and archeological contexts will allow for detailed questions concerning the acquisition and consumption of foodstuffs.

In addition, archeobotanical sampling and analysis of recovered plant macro fossils will serve to establish the nature and composition of historic plant remains enduring at the sites. Quantitative analysis of archeobotanical data will permit the assessment of the dietary contribution of agricultural commodities, supplemental horticulture, and wild plant foods to site residents. These data can also be used to make inter- and intra-site comparisons between individual households. Reconstruction of the historic site environment (i.e. local forest cover) can also be approached based on these data. Finally, archeobotanical data from North Bend will contribute to the growing database of subsistence information for nineteenth- and early-twentieth- century sites in the region (Reitz 1982, 1992; Weinand and Reitz 1992, 1994; Reitz and Ruff 1983, 1984).

Specific questions which will be used to organize the characterization of subsistence among the North Bend laborers include:

- a) what floral species are represented in the assemblages?
- b) what was the contribution of wild floral species to the diet?
- c) what animal species are represented in the assemblages?
- d) what are the ages and sexes of the animals represented in the faunal assemblages?
- e) what cuts of meat are represented in the faunal assemblages?
- f) what butchering techniques (e.g. sawing) can be observed on the faunal remains in the assemblages?
- g) what cooking techniques (e.g. roasting) can be observed on the faunal remains in the assemblages?
- h) what was the relative contribution to diet of the ration provided as part of the laborers' wages?

Research Issue 2 addresses the theme of "Plantation Archeology" identified in Louisiana's *Comprehensive Archaeological Plan* (Smith et al. 1983:279-280).

Research Issue 3. Investigation of the Possible Presence of a Nineteenth Century Component at 16SMY132.

Study Topics:

Was 16SMY132 occupied prior to the 1905 consolidation of Stokely Vinson/North Bend Plantation? What was the nature of this occupation? What does the remains of this occupation tell us about diachronic spatial organization at the estate?

As noted previously, Kuttruff et al. (1993) suggested that occupation of 16SMY132 may date as early as 1830. The presence of mid-to-late-nineteenth century domestic artifacts in this area suggests that it may have been residential. If this proves to be the case, the associated assem-

blage can be compared to those from the twentieth-century quarters households to further investigate diachronic changes in power relations and consumer behavior.

Research Issue 3 addresses the themes of "Plantation Archeology" and "Euro-American Influence on the Landscape" identified in Louisiana's *Comprehensive Archaeological Plan* (Smith et al. 1983:279-280).

Study Priorities

Research Issues 1 and 2 are interrelated, and they are of equal and highest priority because their results have the potential to answer broader social, economic and political questions. Within these, specific questions that require a diachronic perspective (i.e., Research Issue 1, Study Topic 1, Questions c and Research Issue 2, Study Topic 1, Question d) are of less importance, since site testing at 16SMY66 and 16SMY132 does not clearly indicate that data are preserved with which to address change through time. Research Issue 3 is of the least importance both because it is possible that the nineteenth-century ceramics merely reflect relic use by the twentieth-century occupants of the quarters, and because it is likely that the results will be particularistic to North Bend Plantation.

Methodology

1. Prior to the commencement of field investigations, additional research specific to North Bend Plantation will be conducted. This research will include examination of conveyance documents, U.S. census reports, equipment descriptions, and cane production statistics for the estate, in order to provide as much data as possible on the conditions at this plantation (all Research Issues). Specific consideration will also be given to the likely impact of historical technological change and conditions in cane production (on a statewide, parish wide, and individual plantation basis) on the material culture of North Bend Plantation laborers (Research Issues 1, Study Topics 2 and 3, and Research Issue 2). In particular, oral histories concerning life at North Bend (preferably) and other sugar estates in the vicinity will be collected (Research Issues 1 and 2). The historical record will be utilized to develop organizational models which will provide meaning to ambiguous archeological results (Leone and Crosby 1997).
2. Field investigations will commence with re-surveying and tying in both 16SMY66 and 16SMY132 to a drainage culvert located east of both sites, near the new LA Hwy 317 bridge. Should this culvert be inaccessible, both sites will be tied to a USGS benchmark located 1.5 miles south of the North Bend Bridge site (16SMY66) on the west side of LA Highway 317.
3. Subsequent to resurveying, approximately 1 meter of overburden at 16SMY66 will be removed by bulldozer/backhoe to facilitate the placement of the horizontal grid and proton magnetometer survey. The overburden will be removed from the site area and deposited along its southern periphery. This will form a barrier which should deter sightseers from entering the site area. Once the overburden is removed, the area will be staked and flagged with highly visible caution tape, again, to deter all but authorized access. A 5 to 10 cm buffer will be left on top of the midden deposit present at the site in order to prevent the bulldozer/backhoe from disturbing the cultural deposit. The thickness of the buffer zone will be recorded for each unit before it is removed by shovel. The overburden removed from 16SMY66 will not be screened.
4. Site data will be established at 16SMY66 and the North Bend site (16SMY132). Following, grid baselines will be laid on the sites and a preliminary site map will be prepared. Sufficient control point readings will be obtained for preparation of a surface contour map of the sites. Ten centimeter contour intervals will be utilized. Artifact concentrations, natural and

cultural features (including previous excavations and disturbed areas of the site) will be plotted on the site map. The site map will be updated as new excavation units are opened and features encountered.

5. A proton magnetometer will be employed along 2 meter transects and readings will be taken at 1 meter intervals. Magnetometer survey will be conducted at 16SMY66 after the overburden has been removed and the grid established. Both sides of Bayou Sale within the project right of way on the north side of the GIWW will also be surveyed with the magnetometer. Raw data from the magnetometer survey will be refined, and a magnetic contour map will be generated. The magnetic contours will be overlain upon the preliminary site map and interpreted. Corners of the respective cabins and/or other structures potentially located within the research area should be reflected as a "dead" zone surrounded by concentric magnetic contours.

Figures 22 through 26 show 1916 and 1924 maps of North Bend Plantation overlaid on a map of the study area. These illustrate that a double row of cabins was located on the east side of Bayou Sale, and that this cabin row extended from the south bank of the GIWW (16SMY66) to the north bank (16SMY132). In addition, a single row of cabins was present on the west bank of Bayou Sale; the remains of this cabin row are only preserved on the north bank of the GIWW. The magnetic contour map will be placed over the composite maps shown in Figures 22-26 in order to determine the relative accuracy of the magnetic contours and their interpretation.

6. Previous excavations at both sites and projections from map overlays (Figures 22-26) indicate that the remains of approximately 10 quarters cabins should be located in the project area. Also, the map overlays indicate that two larger structures are located north and northeast of the quarters complex. Previous investigations at 16SMY66 indicate that a single midden deposit, dating between 1905 and ca. 1930, is preserved at the site. This midden is probably associated with one or more cabins formerly located in this vicinity. Similarly, test excavations at 16SMY132 demonstrates that a single midden deposit, contemporaneous with and possibly predating that at 16SMY66, is preserved, as are architectural features. Architectural features discovered at 16SMY132 are believed to represent a cabin. Based on these data and the results of the magnetometer survey, the following methodology will be implemented (Figures 26 and 27):

- a) Preliminary controlled excavation units, consisting of hand excavation, mechanical excavation, or a combination of the two, will be placed at 16SMY66 in order to determine if any features associated with quarters cabins are preserved. Map projections indicate that the remains of two cabins may be preserved in the northwest quadrant of the site. Should features be located, a minimum of 8 square meters will be hand-excavated at the site of each cabin discovered in order to obtain a sample of material culture for comparative purposes and to document architectural features (Research Issues 1 and 2). Should no intact remains be encountered during the excavation of the preliminary control units, the square meterage allocated for investigation of 16SMY66 (a minimum of 16 square meters) will be re-allocated to the investigation of resources north of the GIWW.
- b) Previous investigations north of the GIWW and on the west bank of Bayou Sale (Kuttruff et al. 1993) did not reveal any architectural features, but midden deposit was identified. Kuttruff et al (1993:100) state that they believe the historic deposits were either redeposited or were very badly disturbed. However, their investigations were limited to one excavation unit and auger testing. In addition, the stratigraphic sequence described for the west side of Bayou Sale north of the GIWW is not clearly defined, making an assessment of depositional integrity in this area suspect (see Chapter 7). Therefore, ESI suggests that additional work be conducted on the west side of the bayou in order to clarify the nature of the

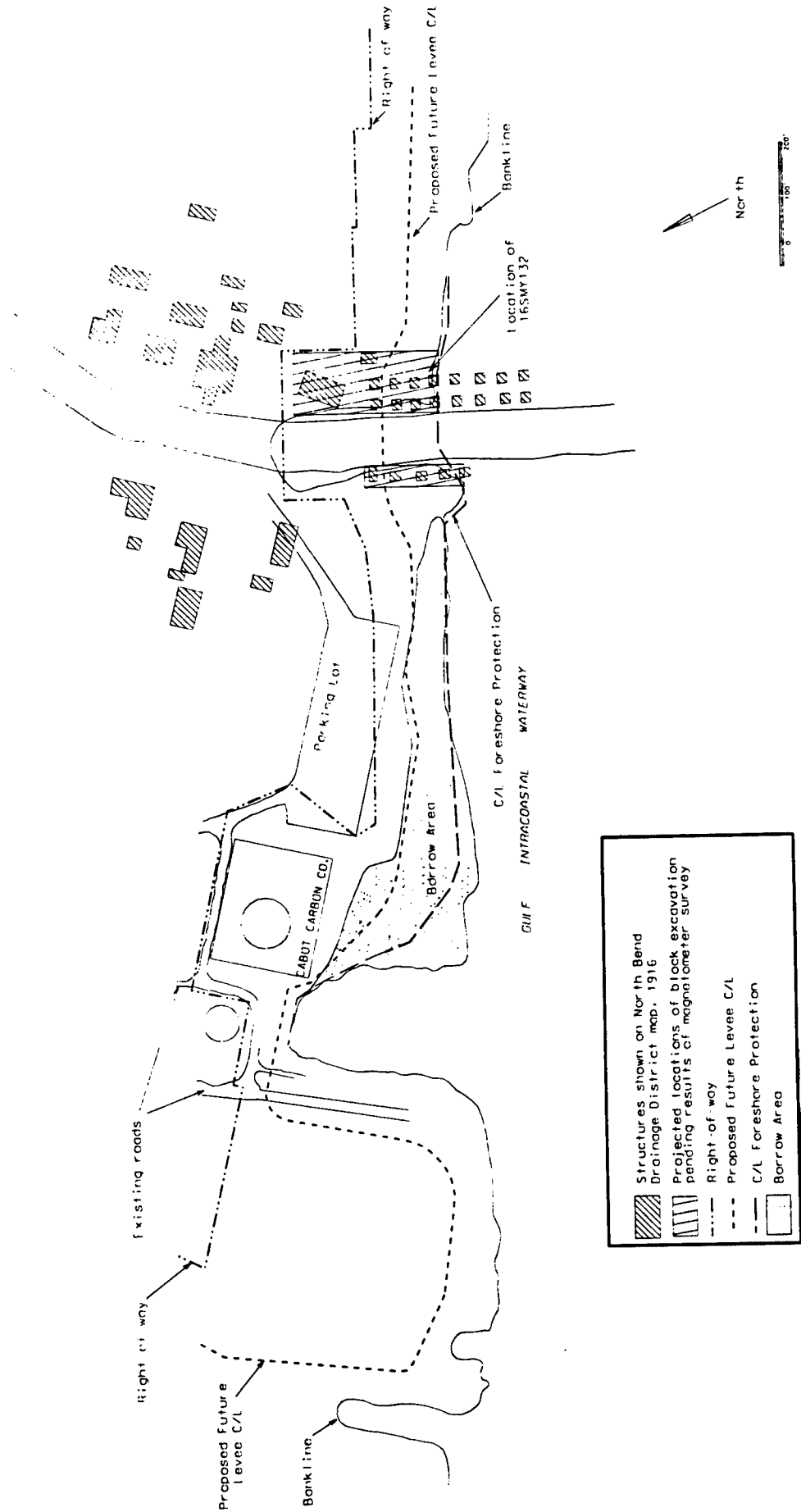


Figure 22. Map of the study area north of the GIWW showing the locations of structures illustrated on a 1916 map of North Bend Plantation.

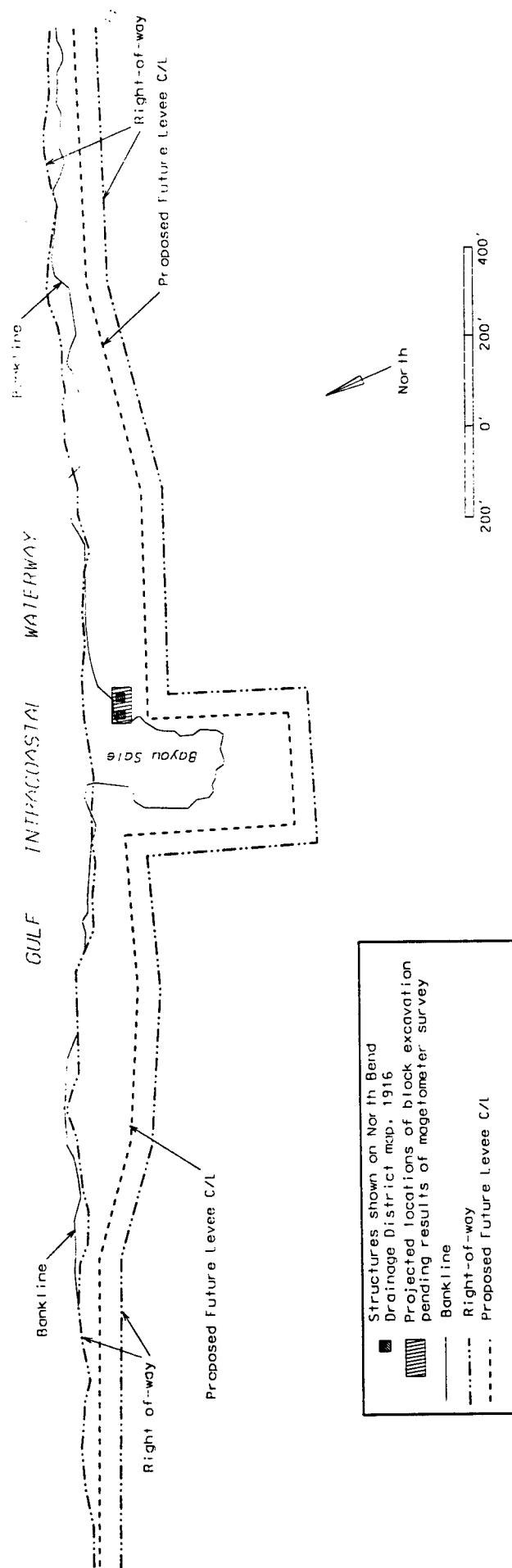


Figure 23. Map of the study area south of the GIWW showing the locations of structures illustrated on a 1916 map of North Bend Plantation.

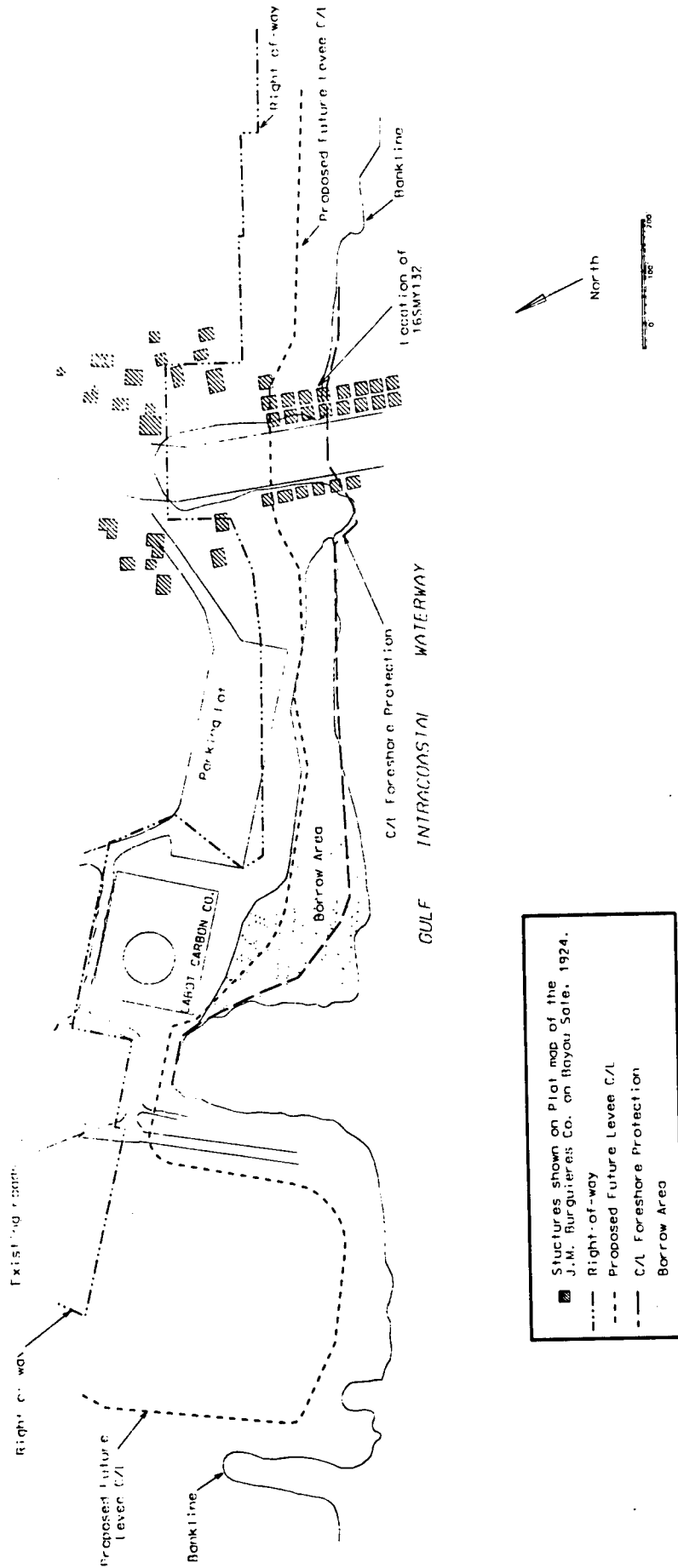


Figure 24. Map of the study area north of the GIWW showing the locations of structures illustrated on a 1924 map of North Bend Plantation.

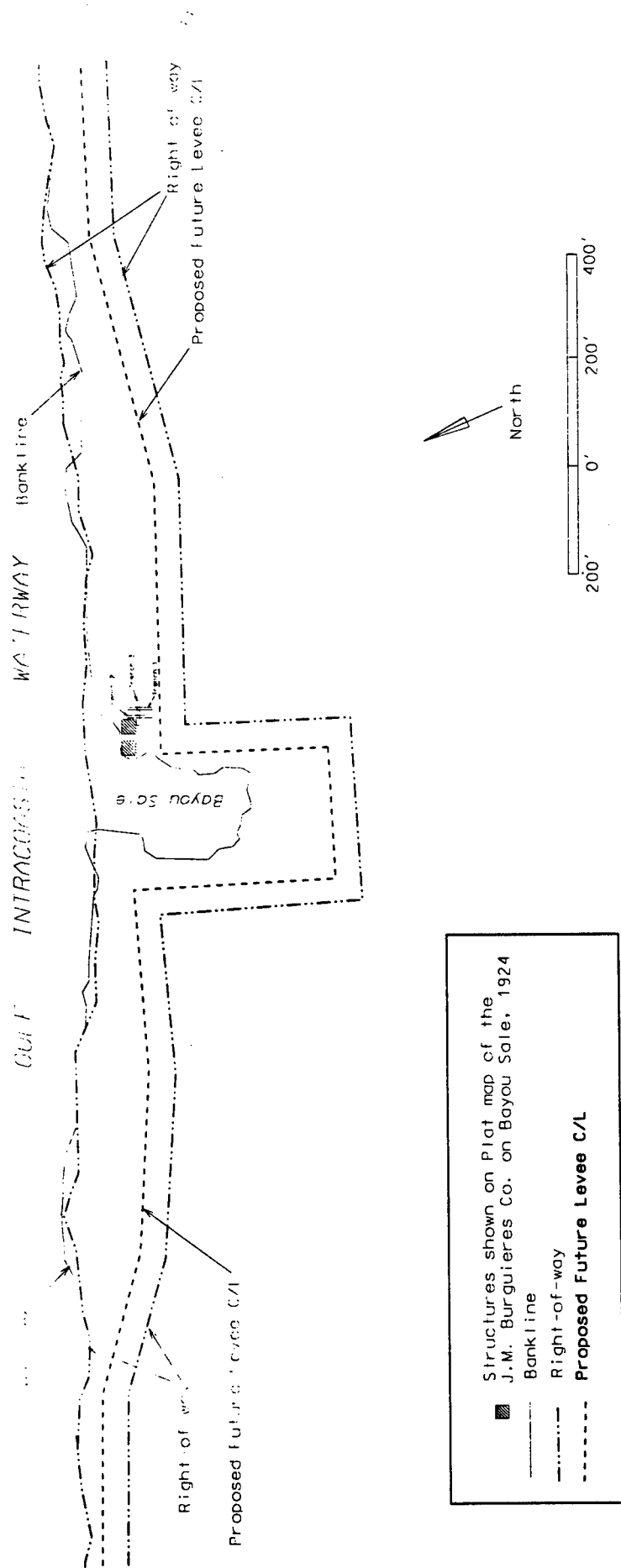


Figure 25. Map of the study area south of the GIWW showing the locations of structures illustrated on a 1924 map of North Bend Plantation.

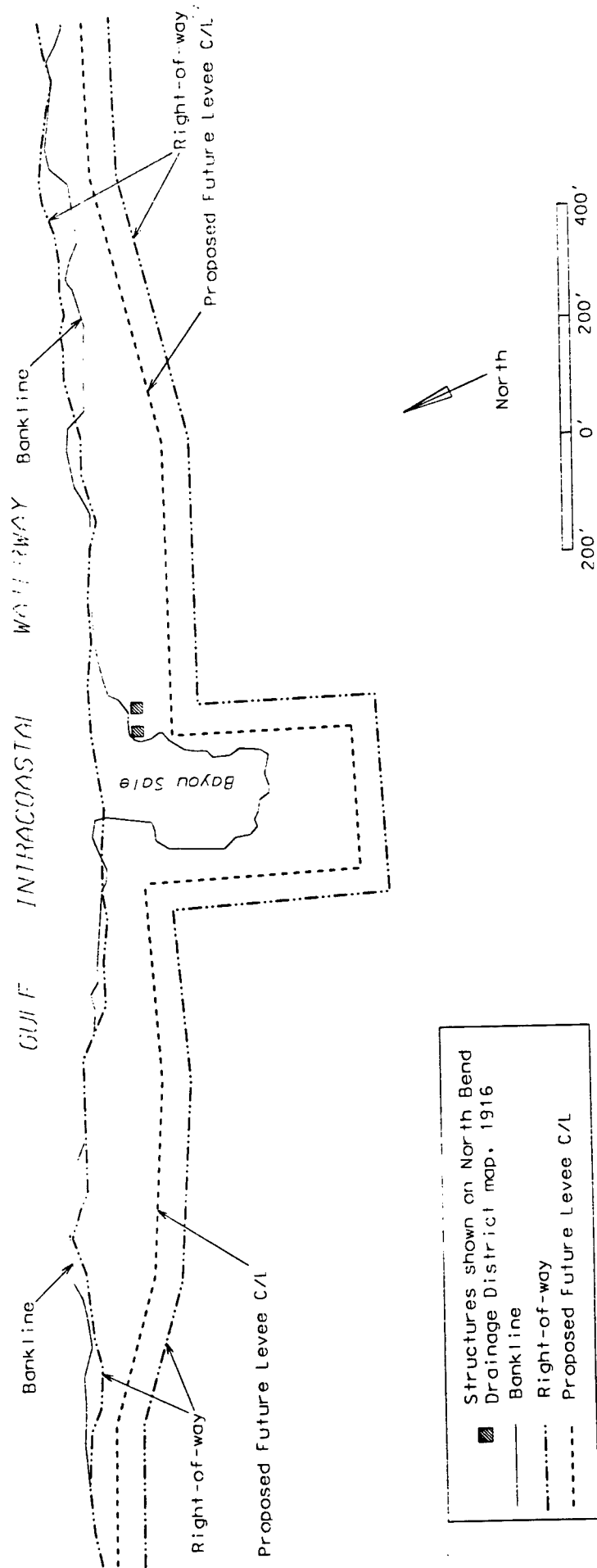


Figure 26. Map of the study area north of the GIWW showing the projected locations of excavation units relative to mapped structures formerly extant on North Bend Plantation.

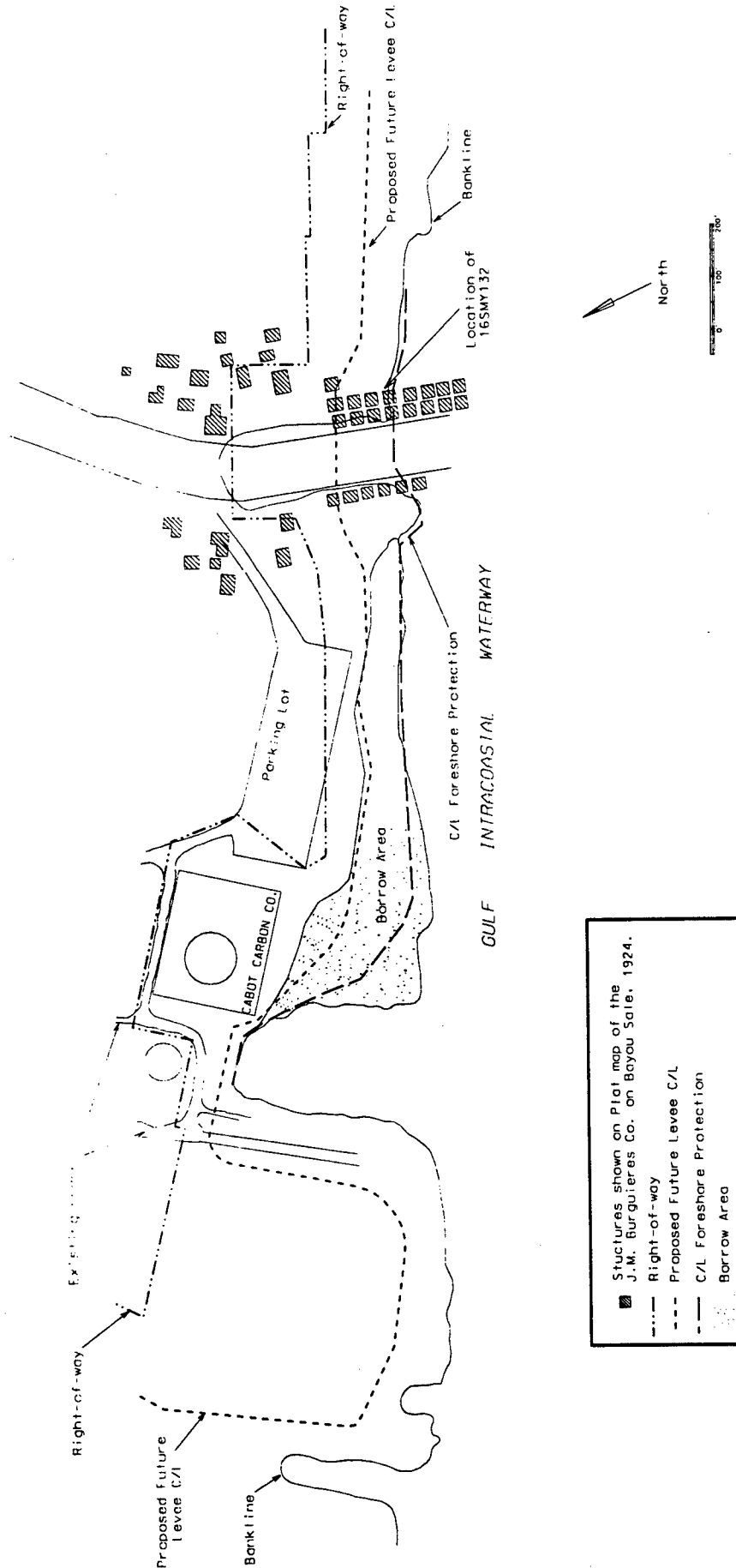


Figure 27. Map of the study area south of the GIWW showing the projected locations of excavation units relative to mapped structures formerly extant on North Bend Plantation.

historic occupations and their depositional environments. Map projections (Figures 24 and 26) indicate that the remains of three or four cabins may be preserved in this area. Therefore, preliminary controlled excavation units, consisting of hand excavation, mechanical excavation, or a combination of the two, will be placed in this area in order to determine if any features associated with quarters cabins are preserved. Should features be encountered, a minimum of 8 square meters will be hand-excavated in or around the site of each of the cabins uncovered. Overburden will be mechanically removed leaving a 5 to 10 cm buffer on top of the culture-bearing strata prior to hand excavation. The overburden will not be screened. The purpose of these excavations is to determine if there are differences in the households located on the east and west sides of Bayou Sale (Research Issues 1 and 2).

- c) Both the 1916 and 1924 maps of North Bend Plantation depict a double row of cabins located on the east bank of Bayou Sale on what is now the north bank of the GIWW. As noted above, excavations by Kuttruff et al. (1993) indicate that intact architectural features and a midden deposit associated with a cabin are present in this area. A minimum of 8 square meters will be hand excavated adjacent to and in the vicinity of Kuttruff et al's (1993) Excavation Unit 1 to obtain a sample of material and "to clarify the precise history and origin of [the] sediments" with relation to the features (Kuttruff et al. 1993:30) (All research issues). In addition, preliminary controlled excavation units, consisting of hand excavation, mechanical excavation, or a combination of the two, will be placed in this area in order to determine if features associated with other cabins are preserved on the east bank of Bayou Sale within the project area. Should features be encountered, a minimum of 8 square meters will be hand-excavated in or around the site of each of the cabins discovered. Overburden will be mechanically removed leaving a 5 to 10 cm buffer on top of the culture-bearing strata prior to hand excavation. The overburden will not be screened. Based on map data, the remains of at least four additional cabins should be preserved on the east bank of Bayou Sale north of the GIWW. These excavations will be utilized to obtain samples of material culture for comparative purposes and to document architectural features (Research Issues 1 and 2).
- d) Both the 1916 and the 1924 maps depict additional structures to the north and northeast of the quarters cabins on the east bank of Bayou Sale. Preliminary controlled excavations, consisting of hand excavation, mechanical excavation, or a combination of the two, will be placed in this vicinity in order to determine if features associated with any of these structures area preserved. Should features associated with one or more of the structures be identified, a minimum of 8 square meters will be hand-excavated at each structure in order to obtain a sample of material culture for comparative purposes, to document architectural features, and to try to identify the function of the structures (Research Issues 1 and 2). Overburden will be mechanically removed leaving a 5 to 10 cm buffer on top of the culture-bearing strata prior to hand excavation. The overburden will not be screened.

A total of not less than 250 square meters of controlled excavation will be opened at 16SMY66 and 16SMY132. If the preliminary units expose structural foundations and/or discreet house midden areas, excavations will expand outward from them in order to adequately define the outlines of the cabin and/or house midden. Hand excavation units will be opened in blocks of at least 2 x 2 m wherever possible. The units will provide a sample of material, faunal, and botanical data to permit the investigation of Research Issues 1 (Study Topics 2 and 3), 2 and 3. If features are found, these will permit Research Issue 1, Study Topic 1, to be addressed.

7. Hand excavation units will be excavated by natural strata to sterile subsoil, and each stratum will be divided into levels not exceeding 5 centimeters in thickness. Material from the units will be water screened through 1/4 inch mesh (all research issues). A pump(s) will be placed on either of the banks of Bayou Sale or the GIWW to facilitate water screening.

8. All features uncovered in the hand excavation units will be planned and photographed. Feature fill will be excavated separately (all Research Issues). All features will be cross-sectioned, drawn, and re-photographed. Features will be numbered sequentially and recorded on the appropriate forms. By recording the horizontal and vertical coordinates and their respective depositional positions, it is hoped that significant changes in the spatial organization of the sites will be revealed (Research Issue 1, Study Topic 1).

9. A 5 liter flotation sample of soil will be collected from one 5 centimeter level within each culturally positive natural stratum (excluding topsoil) in each of the hand excavation units. These samples will be deflocculated and floated on site whenever possible. Normally, all feature fill will be floated, but in the case of features greater than 30 liters in volume, only a 10-liter sample of the soil will be floated. The flotation system will have the basic features of a SMAP machine and will be accomplished following industry standards (Watson 1976; Pearsall 1989). A 0.5 millimeter geological sieve catches the light fraction, and the heavy fraction rests on 1.6 millimeter window screen that replaces the bottom of a metal washtub (Kidder and Fritz 1993). The flotation samples will provide materials for faunal and paleoethnobotanical analysis, as well as small-sized artifacts such as lead shot, beads, etc. (Research Issues 1 and 2, but especially Research Issue 2, Study Topic 2).

10. Plan drawings will be made at the bottom of each level, and a plan drawing of the final floor will be prepared hand excavation unit. A minimum of two profiles will be drawn and photographed in each excavation unit to demonstrate stratigraphy (all research issues).

11. Subsequent to the completion of hand excavated units, mechanical stripping will be undertaken in order to determine if any additional features are located in the cabin areas. Soil removed by mechanical stripping will not be screened. All newly exposed features will be numbered and placed on the site map (Research Issue 1, Study Topic 1). Any features uncovered during stripping will be planned, profiled, photographed, and hand excavated. All feature fill will be floated, unless the fill exceeds 15 liters volume. In the latter case, only a 5 liter sample will be collected for flotation (Research Issues 1 and 2, but especially Research Issue 2, Study Topic 2).

12. Although burials are not anticipated at these sites, if one is encountered during excavation, that unit will be discontinued immediately and the appropriate procedures will be instituted in accordance with the Louisiana Unmarked Human Burial Sites Preservation Act. If the burial is determined to be other than a recent one (e.g., homicide, suicide, accident), then the procedures of the Section 106 compliance process will take precedence over those of the Louisiana Unmarked Human Burial Sites Preservation Act.

Analytic Methods

1. The techniques of *terminus post quem*, mean ceramic dating, and bracketed dating will be utilized as applicable to date individual features and deposits (all research issues, but primarily Research Issue 1, Study Topic 1).

2. Comparison of data recovered from individual cabin locales will enable the examination of the material culture of the inhabitants of the North Bend (Research Issue 1, Study Topics 2 and 3, and Research Issue 2). A comprehensive ceramic classificatory system (Yakubik 1990) will be employed to facilitate examination of economic and site chronology issues (all research issues). Minimum numbers of vessels will be calculated for both ceramic and glass artifacts. Artifact functional groups will be analyzed utilizing a flexible formal typology (Yakubik and Franks 1992b, Franks and Yakubik 1991). This framework broadly classifies artifacts into two groups: those that reflect consumption and those that reflect production. The consumption

group is broken into the sub-categories of Architecture, Furnishing, Clothing, Health/Hygiene, Adornment/Personal, Food Consumption, Beverage Consumption, Medicine Consumption, and Leisure Activities, each of which is in turn subdivided by material. Use of this typology will enable comparisons of the relative frequencies of different functional categories of artifacts (Research Issue 1, Study Topics 2 and 3, and Research Issue 2, Study Topic 1).

Because the occupation dates to the twentieth century, ceramic index values (Miller 1980, 1991) cannot be calculated for the collections from North Bend Plantation. Nonetheless, research has demonstrated that lower class households tend to have more undecorated wares, fewer decorative varieties, and fewer specialized forms (Shepard 1987; Branstner and Martin 1987). By examining ware type, decorative type, and form (including diameter) separately using minimum vessel counts (viz. Lucas 1994), and by developing consumer choice profiles (Spencer-Wood 1987) for individual households using available pricing data (viz. Yakubik and Franks 1992b), relative expenditures for goods may be compared. Similarly, these data will then be compared to available data from other African-American and Euro-American sites (Research Issue 2, Study Topic 1).

3. Faunal material recovered from water-screening and flotation will be analyzed. The heavy fraction from flotation will be sorted through nested 1/4", 1/8", and 1/16" mesh in the laboratory. Material from the 1/4" and 1/8" samples will be analyzed, and the 1/16" sample will be examined to determine if it can provide additional information. Identification of species, bone elements, and age, will be undertaken as applicable. Basic information will be quantified, including Number of Identified Specimens, Minimum Number of Individuals, and available biomass (Research Issue 2, Study Topic 2). Sampling procedures will be employed as necessary to avoid time-consuming collection of redundant data. Samples chosen for investigation will be determined by the analyst in consultation with the excavators.

4. Macrobotanical remains will be collected during field excavations through systematic soil sampling. Plant remains recovered through water flotation will be separated into two size fractions (>2mm and <2mm) for analysis. From the larger size fraction (>2mm) all categories of vegetative material (i.e. wood, nuts, seeds, pits, etc.) will be removed for identification. Seeds and the remains of cultivated plant parts will be gleaned from the <2mm size fraction. All identifications will be made with the aid of standard texts, and confirmed against a modern reference collection germane to the flora of the project area (Research Issue 2, Study Topic 2). Sampling procedures will be employed as necessary to avoid time-consuming collection of redundant data. Samples chosen for investigation will be determined by the analyst in consultation with the excavators.

5. All artifacts, samples, field records, maps, plans, and photographs will be curated with the Louisiana Division of Archeology. These materials and records will be cataloged utilizing the format currently employed by the State Archeologist.

6. The research design will be assessed by the extent to which the proposed field and analytic methodologies facilitated addressing research objectives. The evaluation of the research design will provide information on how future research designs may be modified based on the relative success of the research conducted at the North Bend Plantation. The evaluation of the research will be presented in the technical report of investigations.

7. A technical report will be produced in accordance with the standards and guidelines set forth by the *Secretary of the Interiors Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48(190) 1983:44716-44737). The report will minimally include a description of the study area; relevant historical documentation and background research; the research design; the field studies/investigations; all field observations; analyses and results

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APPENDIX I
SCOPE OF SERVICES

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**MODIFICATION 01* to
SCOPE OF SERVICES**

Cultural Resources Investigations of the
East and West Bayou Sale Tie-in Levee,
St. Mary Parish, Louisiana

1. Introduction. The archeological site testing and survey to be performed under this delivery order are in support of proposed improvements to the Atchafalaya Basin, Levees West of Berwick project. The East and West Bayou Sale Tie-in Levee consists of levee enlargement and foreshore protection along the south bank of the Gulf Intracoastal Waterway (GIWW) where it crosses Bayou Sale. Cultural resource impacts could result from the proposed levee construction and foreshore protection which will involve bank grading and the placement of shell and rock on the bankline of the GIWW. One archeological site, the North Bend Bridge Site (16SMY66) was reported in 1977 by Rivet during his survey of a new bridge crossing. The site was only briefly examined and further survey and testing is necessary to determine its extent and significance.

2. Study Area. The work consists of the project right-of-way for the East and West Bayou Sale Tie-in Levee as shown on the attached map (Attachment a). The survey and site testing will be conducted within the limits of levee work from Sta. 0+00 (on western end) to Sta. 36+43.8 (on eastern end), from the water's edge of the GIWW to the outside right-of-way line (approximately 50 feet from the centerline of the levee).

3. Background Information. Rivet described site 16SMY66 as wave-washed shell deposits, consisting primarily of *Rangia* shell with some oysters (Attachment b). No in situ deposits were identified and the assigned cultural affiliation was historic - unknown. The site was described as being located in the south bank of the GIWW just west of the existing bridge (since replaced with a new bridge) with its western limit demarcated by a pipeline crossing.

The proposed levee right-of-way was visited in late 1996 by Corps staff archeologists in preparation for the present study. This site visit noted several areas of shell lenses eroding into the GIWW in the general vicinity of the reported site. In some places, brick and glass were also noted in the shell deposits along the eroding beach. The site visit also revealed the highly disturbed nature of the study area. Noted were numerous modern cultural features such as road beds, asphalt and concrete roads and platforms, pipeline crossings and miscellaneous cultural debris.

* Modifications are shown in bold italics type.

4. General Nature of the Work. The study will consist of historical research relative to the study area, intensive cultural resources survey of the levee right-of-way, archeological testing of the North Bend Bridge Site (16SMY66), and data analysis and report preparation.

5. Study Requirements. The study will be conducted utilizing current professional standards and guidelines including, but not limited to:

- the National Park Service's National Register Bulletin 15 entitled, "How to Apply the National Register Criteria for Evaluation;"
- the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation as published in the Federal Register on September 29, 1983;
- Louisiana's Comprehensive Archeological Plan dated October 1, 1983;
- The Advisory Council on Historic Preservation's regulation 36 CFR Part 800 entitled, "Protection of Historic Properties."

The study will be conducted in four phases: Historical Research, Survey of the Levee Right-of-way, Testing of North Bend Bridge Site, and Data Analysis and Report Preparation.

A. Phase 1: Historical Research. The study will begin with research of available literature and records necessary to establish the historic setting, predict the nature of the resource base in the project area, and refine the survey and testing methodology. This background research will include a literature review, review of the geomorphology, and research of historic maps and records. Historical research will include title searches and review of other written, cartographic and aerial photography records sufficient to reconstruct the historic uses of the study area. The contractor shall also perform one or more site visits to familiarize himself with site conditions.

A brief interim report will be prepared at the conclusion of this phase and submitted to the Contracting Officer's Representative (COR). The report will specifically include the following:

(1) a brief description of the study area's geomorphology, prehistory, and history as they relate to the location, identification, and evaluation of cultural resources;

(2) predictive statements of the archeological expectations based on the background research, and

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(3) refinements in the survey and testing methodologies as necessitated by these predictions.

The report shall be submitted within 4 weeks after delivery order award for review and approval. All review comments will be resolved or incorporated within 1 week after submittal.

B. Phase 2: Survey of the Levee Right-of-way. Upon approval of the Phase 1 report by the COR, the Contractor shall initiate the fieldwork. Standard terrestrial survey as described below, and further refined in the phase 1 report, will be employed. The intensive pedestrian survey will include careful bankline inspection and will utilize transect lane spacing of 10 meters and a shovel testing interval of 20 meters in an offset pattern. Shovel tests will be approximately 30x30 cm in the horizontal plane and will be excavated to sterile subsoil (approximately 25-50 cm deep). The excavated soil will be screened through 1/4 inch wire mesh. This systematic procedure will be supplemented with judgmental shovel testing where the background research indicates a high probability for historic sites.

All sites located in the survey corridors will be mapped, photographed, and briefly tested using shovel, auger, and limited controlled surface collection to determine depth of deposit, site boundaries, stratigraphy, condition, and cultural association. At a minimum, site maps will show site boundaries, locations of features and artifact scatters, locations of all subsurface testing units, and prominent natural and cultural features in the site area. All shovel/auger tests and excavation units will be immediately backfilled upon completion of archeological recordation.

For all sites discovered during the survey, the Contractor will file state site forms with the Louisiana State Archaeologist and cite the resulting state-assigned site numbers in all draft and final reports. In addition, the Contractor will submit site update forms to the State Archeologist for all previously recorded sites. These forms will correct previously filed information where appropriate and summarize the results of the present investigation. All sites located within the project area will be recorded to scale on the appropriate 7.5 minute quadrangle and aerial mosaic project maps. The quadrangle maps will be utilized to illustrate the site forms. One copy of the aerial mosaic project maps, marked with the locations of all sites and historic structures in the project easement, and two unbound copies of each site and site update form will be submitted to the COR with the draft report.

Any standing structures located in the survey area will be identified by function, dated and described in standard terminology of formal and/or vernacular architecture, as appropriate. Each structure predating 1945 or of potential National Register eligibility will be recorded on Louisiana state standing structure forms accompanied by a minimum of three black

and white photographs showing front, back and side views of the structure. The Contractor will determine whether subsurface features are present. If present, the structure and features will be treated as a site and documented accordingly. The Contractor shall assess the significance, i.e. the National Register eligibility, of all standing structures. Two copies of all standing structure forms will be submitted with the draft report.

C. Phase 3: Testing of North Bend Bridge Site. The reported location of site 16SMY66 will be intensively tested with bankline inspection, shovel and auger testing, hand excavation of 1 x 2m test units and/or backhoe trenching. The specific methodology to be employed will be that contained in the approved Phase 1 report. Generally, however, the site testing will commence with the establishment of a grid over the site area tied to the Corps baseline. Next, the Contractor will perform bankline inspection and profile recordation to assess the elevation and linear extent of the site. Utilizing tightly spaced shovel and/or auger testing, the Contractor shall determine the site boundaries, depth of deposit, stratigraphy, cultural association, and possible activity areas. The results of these methods will be used to select the locations of test excavation units and/or backhoe trenches. These excavations will be designed to determine site integrity, stratigraphy, range and density of various artifact categories, and research potential of the site.

Excavation units will be limited to the minimum necessary to assess the site's National Register eligibility. Test units will be excavated in 10cm levels unless natural stratigraphic levels can be recognized. All profiles and features excavated will be mapped and photographed. Detailed site maps illustrating the horizontal extent of the site, the stratigraphy, the locations of all subsurface tests, the delineation of disturbed portions of the site, feature locations, and artifact densities will be prepared.

D. Phase 4: Data Analyses and Report Preparation. All data will be analyzed using currently acceptable scientific methodology. The Contractor shall catalog all artifacts, samples, specimens, photographs, drawings, etc., utilizing the format currently employed by the Louisiana State Archeologist. The catalog system will include site and provenience designations.

All cultural resources located by the survey will be evaluated against the National Register criteria contained in Title 36 CFR Part 60.4 to assess the potential eligibility for inclusion in the National Register. The Contractor will classify each site as either eligible for inclusion in the National Register, potentially eligible, or not eligible. The Contractor shall fully support his recommendations regarding site significance. For those sites considered worthy of additional testing, the Contractor will recommend a specific testing plan.

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The Contractor shall also recommend appropriate mitigation measures for all sites classified as eligible.

The North Bend Bridge Site (16SMY66) will be evaluated against the National Register criteria and within the framework of the site's historic setting to assess its eligibility for inclusion in the National Register. If the site is recommended as eligible, the Contractor shall consult with the technical representative to review the project design and possible project effects.

All information indicates that the North Bend Bridge Site (16SMY66) is a component of the adjacent North Bend Site (16SMY132) which was previously investigated by Kuttruff et al (1993) and is scheduled for data recovery excavations in the near future. Due to this fact, the two sites (actually one site with components on opposite sides of the GIWW) will be subject to mitigative data recovery together.

The contractor will prepare a detailed research design for archeological data recovery of the 16SMY66/132 site. The research design will be incorporated into the draft and final reports of investigations (section 6.b. below) and will meet all professional standards including, but not limited to the following:

- (1) Secretary of the Interior's Standards and Guidelines for Archeological Documentation, dated September 29, 1983, Federal Register Vol. 48, No. 190, pages 44734-44737;
- (2) Advisory Council on Historic Preservation's publication entitled "Treatment of Archeological Properties: A Handbook" dated November 1980; and
- (3) Advisory Council on Historic Preservation's article entitled "Consulting About Archeology Under Section 106" dated 1991, CRM Vol. 14, No. 1, pages 15-18.

The analyses will be fully documented. Methodologies and assumptions employed will be explained and justified. Inferential statements and conclusions will be supported by statistics where possible. Additional requirements for the draft report are contained in Section 6 of this Scope of Services.

6. Reports:

a. Phase 1 Report. Two copies of the report on the results of the Phase 1 investigations will be submitted to the COR within 4 weeks after work item award for review and approval. All review comments will be resolved or incorporated within 1 week after submittal. This report will present in detail the proposed field methodology.

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b. Draft and Final Reports (Phase 1-3). Six copies of the draft report integrating all phases of this investigation will be submitted to the COR for review and comment within **24** weeks after delivery order award (**September 22, 1997**). Along with the draft reports, the Contractor shall submit:

(1) One copy of the aerial mosaic project maps, marked with the locations of all sites and standing structures in the project easement;

(2) two unbound copies of each site, site update, and standing structure form;

(3) three copies of the National Register Registration Forms for each site recommended as eligible for inclusion in the National Register. This documentation will contain all of the data required by NPS National Register Bulletin 16: Guidelines for Completing National Register of Historic Places Forms.

The written report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8-1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 8 weeks after receipt of the draft reports (24 weeks after work item award). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR within 4 weeks (28 weeks after work item award). Upon approval of the preliminary final report by the COR (within 1 week after submittal), the Contractor will submit 40 copies and one reproducible master copy of the final report to the COR within 32 weeks after work item award. The Contractor will also provide computer disk(s) of the text of the final report in Microsoft Word or other approved format.

Included as an appendix to the Final Report will be a complete and accurate listing of cultural material and associated documentation recovered and/or generated. In order to preclude vandalism, the final report shall not contain specific locations of archeological sites. Site specific information, including one set of project maps accurately delineating site locations, site forms, black and white photographs and maps, shall be included in an appendix separate from the main report.

7. Right-of-entry. The New Orleans District has obtained right-of-entry for archeological investigations in the study area.

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8. Attachments.

- a. DWG. 1 of 2, File No. H-8-40680.
- b. Louisiana Site Record Form for North Bend Bridge Site (16SMY66).